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THE
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ORIGINAL ARTICLES

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NON-SPECIFIC IMMUNITY[1]

BY COL. VICTOR C. VAUGHAN AND CAPT. G. T. PALMER, M.C., U. S. A.

IT STANDS out prominently in the records that the seasoned soldier is more resistant even to newly imported infections than the recent recruit. It is equally evident that the men from crowded cities resist these infections transmitted from and to the respiratory tract more successfully than their comrades from sparsely settled areas. Why did the rurals fall more ready victims to pneumonia than the urbans. Did it mean that the latter as a result of the crowd life, which they had previously lived, had acquired a degree of immunity by frequent exposure to those bacteria which cause the pneumonias. This is the answer which we were inclined to give after our study of the communicable diseases as they prevailed in our army during the winter season of 1917–18. However, since we know that there are many bacteria any one of which may induce a pneumonia and so long as we believe that bacterial immunity is strictly specific, it seemed necessary to suppose that each urban man had been exposed to each and every species and strain of this organism which may induce pneumonia and for a sufficient length of time to acquire a protective immunity. The epidemic of influenza during the fall of 1918 has shown, however, that the seasoned soldier is more resistant to an infection, new to the whole command, than is the man who has recently come into the service. This has raised in our minds the question: Is there any scientific evidence of the possibility of the development of a non-specific bacterial immunity, or increased resistance to infection. If this could be demonstrated, it would explain one of the problems which has troubled the student of epidemiology in both civilian and military life, especially the latter. We have seen that the assembly of large numbers of recruits may increase the army death rate more markedly than participation in active hostilities. In this frame of mind we have searched the literature of the subject of immunity for evidence

[1] Read at the Annual Meeting, The Association of Military Surgeons, St. Louis, Mo., Oct. 13-15, 1919.

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bearing on this point, and we believe that we have found in certain researches made by the recently deceased Maj. Victor C. Vaughan, Jr., and first reported as early as 1905.[1]

We propose to briefly review this work and discuss its bearing on the possibility of the development of a non-specific immunity. Previously it had been shown by Vaughan, Sr., and Wheeler that bacterial cellular substances, both that from pathogenic and non-pathogenic bacteria, furthermore that all true proteins, bacterial, vegetable and animal, could be split by chemical agents into poisonous and non-poisonous fractions; that the latter is common to all proteins, while the former is specific for each protein. From experimental results obtained with these fractions, these investigators formulated their theories on the phenomena of infection, bacterial immunity, sensitization and vaccination.

Vaughan, Jr., attempted to establish immunity in animals with the poisonous and non-poisonous fractions of proteins. It is with the results obtained with the former that we are now concerned. The poisonous fraction, known as the "protein poison," is the same so far as the gross effects on animals are concerned, whatever the protein from which it has been obtained. By injecting this protein poison, beginning with a non-fatal dose and gradually increasing this amount, he found that a certain degree of tolerance could be established. On this point he wrote as follows:

> From a study of the protocols it can be seen that in the case of both guinea-pigs and rabbits after the administration of several doses of gradually increasing strength, a point is reached at which the animal is able to withstand the injection of from two to three times the amount which would have normally proved fatal for an inactivated control. This would indicate that during the course of treatment the animal had developed either a slight degree of immunity or had established a certain amount of tolerance for the poison. Which of these explanations is the correct one can be determined only after a careful study of the subject of the possible production of passive immunity and the demonstration of a possible antibody in the blood of the animals. At present, owing to the slight amount of increased resistance which the animals exhibit to the action of the poison, we are inclined to believe that the question is one of tolerance. Although the degree of tolerance thus far secured has been limited, we do not feel justified in concluding that greater resistance to the poison may not be obtained. There are many factors of primary importance in this work, all of which must be carefully studied before definite conclusions can be drawn. For example, the interval of time which is allowed to elapse between the injections is a matter of first importance. Since the length of time over which the poison acts is apparently so short, it seemed quite probable that any reaction which might occur on the part of the body would develop in a comparatively short time after the injection. With the object of determining whether this be true or not, animals were treated daily with gradually increasing doses with the following results.

[1] *Jour. Med. Research*, 1905, xiv, page 67. See also "Protein Split Products in relation to Immunity and Disease. Lea & Febiger, 1913.

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Here the protocol of these experiments is given and the results are stated as follows:

From this we see that it is possible to establish a certain amount of tolerance by means of daily injections of the poisonous protein. Here again we find that it is comparatively easy to resist a dose which corresponds to about twice the fatal amount, but above this the animal cannot be carried. When death results from a dose of this poison which is too large to be borne by the treated animal, the symptoms are identical in all respects with those which occur in the case of an untreated animal, and a fatal result follows in the same length of time.

We believe that Vaughan, Jr., was quite right in holding that his findings were due to increased tolerance of the protein poison and that this state should not be regarded as a form of immunity. It is non-specific. An animal which has been made tolerant of the protein poison obtained from the colon bacillus is equally tolerant of that from the anthrax bacillus or that from egg-white. The blood of the tolerant animal contains no antibody.

That a small degree of tolerance for the protein poison may be established in animals is in our opinion also shown by a study of the phenomena of multiple sensitization. An animal is sensitized to two or more proteins. After the proper lapse of time a small amount of one of these proteins is injected into the sensitized animal. This dose must be such that it induces anaphylactic sysptoms, but not enough to kill. The next day another of the proteins is injected into the animal. If the killing dose has been accurately determined, it will be found that the minimum fatal dose has been increased by the procedure of the preceding day. On the first day a non-fatal dose of the protein poison has been set free in the animal body, consequently a larger than the normal killing amount is required to kill on the second day. This demonstration requires a nice adjustment of dosage and the phenomenon was first reported by Friedbreger. *It is an established fact that an increased tolerance to the protein poison can be established, that it is non-specific and that no antibody is generated.*

Now we come to the most interesting and the crucial point of this study, and in doing so we will again quote from the article written by Vaughan, Jr., in 1905.

The question now arises as to whether these animals, which had acquired a tolerance for the poisonous proteins of the colon bacillus, were more resistant to inoculation with the living germs than were untreated animals. In order to ascertain this point, guinea-pigs which had received (in broken doses) from 174 to 235 c.c. of the toxic protein were inoculated intraperitoneally with doses of the living germ with the following results.

Here follows a protocol showing that the tolerant animals did bear inoculation with amounts of the living culture that killed all untreated animals.

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The author continues:

That an active immunity is also developed in rabbits which have been treated with repeated injections of the toxic protein is illustrated by the following experiments:

Rabbit No. 1. Received between May 25 and July 5 eight injections of this toxic protein, the total amount of poison injected being 855 mg. On July 8 this animal received 5 c.c. of a twenty-four-hour culture of the living germ without apparent effect. The control inoculated at the same time (with the same amount of the same culture) was found dead in eight hours.

Rabbit No. 2. Received between May 28 and July 18 eleven injections of this toxic protein, the total amount of the poison given being 2,475 c.c. On July 27 this animal was inoculated with 5 c.c. of a sixteen-hour culture of the colon bacillus without effect. The control was found dead in ten hours.

Rabbit No. 3. Received between June 27 and July 18 seven injections of this poison, the total amount given being 2,475 mg. On July 27 this animal was inoculated with 6 c.c. of a twenty-hour culture. Recovered.

Rabbit No. 4. Received the same amount of poison as the preceding one. Twelve days after the last treatment this animal was given 6 c.c. of a forty-four hour culture and recovered. The control was found dead in eight hours.

From the foregoing experiments it becomes evident that animals which have been treated with the toxic protein of the colon bacillus acquire a certain degree of immunity to the living germ. We are as yet unable to state whether it is possible to obtain a high degree of immunity with the poisonous protein or not. Thus far we have had animals which have withstood inoculation with from two to four times the fatal dose of the living germ. It is worthy of note in this connection that animals which had received one injection of a non-fatal dose of this poison are able to withstand inoculation with twice the lethal dose of the living germ on the following day. The immunity which follows a single injection is, however, transitory and has usually disappeared on the second day following the treatment. This would seem to be the most marked difference between the immunity which results from a single injection of the toxic protein and that which follows a series of injections extending over a considerable interval of time. In the first instance the protection afforded is very temporary, while in the second it is still present after the lapse of from twenty-five to thirty days. It may be possible that in the case of the injections extending over a long period of time the immunity obtained is of a higher degree. This is a point which will require further study.

In the case of an animal which has been treated with poisonous protein and has subsequently received a dose of the living germ which would surely have proved fatal for a normal animal, the symptoms noticed are identical in every respect with those which follow a non-lethal dose in an untreated animal. This is a very important fact and one upon which we have laid much stress. Moreover, as can be seen from Fig. 8 [not reproduced here] the temperature curve corresponds very closely with that obtained in the case of the normal animal inoculated with a non-lethal dose of the living colon bacillus.

We see that in both instances there is no appreciable fall in body temperature until from six to eight hours after inoculation. At this time the minimum temperature has been reached in each case, and within from ten to twelve hours it has returned to normal. The similarity of the symptoms in the two instances leads us to believe that in all probability we are dealing with an immunity which is identical in character with that which is usually spoken of as natural immunity. This idea has been upheld by the fact that we have been able to obtain from egg-albumen and pepton

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poisonous substances which resemble the toxic protein of the colon bacillus in their action, and by the injection of single non-fatal doses of which it is possible to obtain the same transitory immunity to the living colon germ as is observed after the injection of the colon poison. That this toxic group is common to certain bacteria and other protein bodies is not improbable, and this would furnish an explanation not only of the increased resistance to certain bacterial infections occurring in animals treated with albumen and pepton, but of some phases of natural immunity as well.

It is evident that a non-specific bacterial immunity, never reaching a degree comparable with that attainable in toxic immunity, but certainly affording protection beyond that usually present, is secured by repeated introduction of the protein poison into the body.

That his non-specific immunity should be especially effective between diseases whose causal agencies enter the body through the same tissues seems probable. However, this is a matter for speculation, and there is no scientific basis for its discussion.

Vaughan, Jr., immunized animals with the non-poisonous part of the colon bacillus and pointed out the differences in behavior of the animals immunized with the two portions on subsequent inoculation with the living culture. On this point he wrote as follows:

When we turn our attention to the symptoms which follow the injections of living cultures of the colon bacillus into animals which have been actively immunized with the split products, we find that the clinical picture differs materially according to whether they have been treated with the toxic protein or with the residue (non-poisonous split product). As has been previously mentioned, the symptoms which are observed in a pig immunized with the toxic part are apparently identical with those which one sees in a normal animal after inoculation with a non-lethal dose of the living bacillus. The picture which is obtained on inoculation of animals rendered immune by treatment with the residue is, however, quite different. In this case the animals become apparently very ill within an hour after inoculation with the living germ. Indeed, so noticeable was this fact and the treated pigs appeared so much sicker than did the controls that our first thought was that we had in some manner increased their susceptibility to subsequent infection by treatment with the residue. However, after from six to eight hours the treated animals appeared in much better condition and eventually recovered, whereas the controls invariably died.

The temperature curves in the two sets of animals vary in accordance with the above statements.

The immunity induced with the poison is non-specific; that induced with tne non-poisonous part is strictly specific. An animal treated with the residue of the colon bacillus acquires an immunity to that organism and to no other. Moreover, in order to induce immunity of this kind, one must employ the non-poisonous part of the colon bacillus. The non-poisonous portion of any other protein will not give such immunity. On the other hand, the poisonous part of any other protein induces the non-specific immunity.

Non-specific immunity is of low grade and usually suffices to protect

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against only the minimum fatal dose, rarely to twice this amount. The specific immunity may protect against from two to twelve times the minimum fatal dose of the living bacillus. Both forms of bacterial immunity are low compared with the possibly high development of toxin immunity.

As we have previously stated, we believe that the scientific work, referred to above, satisfactorily explains the frequently recorded oversvations:

1. That when armies are recruited and men from all fields of life are crowded together, those from areas sparsely populated and who are unaccustomed to crowd life will prove most susceptible to infection and especially to those infections which are transferred through the respiratory organs.

2. That the man who has been long accustomed to crowd life and who has consequently frequently inhaled particulate protiens (bacteria), whether they be pathogenic or non-pathogenic, acquires a non-specific immunity, which helps him in withstanding infection.

3. That the seasoned soldier bears even newly imported infections better than his comrade who has recently joined the ranks.

In arriving at this conclusion we are not forgetful of the many minor helps at the service of the seasoned soldier, and which are unknown, unused and in many instances wholly disregarded by his undisciplined comrade. There may be, and probably is, in the seasoned man some manner of physiologic adjustment to the altered conditions under which he lives, but we are inclined, so far as his increased resistance to infection is concerned, to stress the non-specific immunity which he acquires. As has been shown by the animal experiments cited, this is easily induced, fluctuates within short periods of time, and within relatively narrow limits acts as a life saver. With this in view, let us turn back and review briefly the epidemic of influenza at Camp Shelby. The first epidemic of this disease struck the troops in this camp in April, 1918. At that time practically all the men were relatively seasoned soldiers. Out of a total strength of about 26,000, there were less than 2,000 who were affected. Still, from the fact that the remaining 24,000 were not affected by the subsequent importation of this infection in more virulent form, we believe that practically all were infected to a sufficient degree to acquire a specific immunity, but not seriously enough to induce at the time symptoms gross enough to come above the plane of clinical observations, or even to be recognized by the infected. In this way a non-specific immunity enabled this division to acquire a specific immunity which protected the men against a much more virulant influenza.

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In other words, by a natural method, vaccination of large numbers was effectively secured.

We do not believe that this non-specific immunity prevents infection with a newly imported virus, but that it mitigates the effects of this infection in some instances so markedly that no symptoms are recognizable, while in others its effects are shown only in the lower death rates among those possessing it. We have seen from the animal experiments that non-specific immunity is of low grade. It protects quite securely against the minimum lethal dose of the culture, rarely against twice this amount, but beyond this it usually fails. However, this specific immunity, which the non-specific form has enabled the individual to attain, may protect against from eight to twelve times the minimum lethal dose.

It may be well to go into more detail concerning our understanding of the natural development of these two forms of immunity. In doing this we will concern ourselves especially with those diseases whose causative agents are transferred from the respiratory organs of one to the corresponding organs of another and which for the sake of brevity we have designated as "respiratory diseases."

A recruit who has never had measles comes into camp. He has escaped this disease simply because he has never been exposed to it. We make this assertion because we think that the evidence which we have presented shows that this disease when once introduced into one of our crowded camps went through it until it reached every man who had not actually had this disease. Quarantine may have delayed the progress of this disease and has undoubtedly been of benefit because it has given the susceptibles opportunity to acquire non-specific immunity, which, although it does not protect them against measles, mitigates the gravity of this disease. It makes a great difference whether our non-immune recruit is immediately exposed to measles as soon as he reaches camp (in our mobilization many men were exposed to this disease on the troop train, before they reached camp) or after months of crowd life. In the latter instance he inhales daily more or less of foreign protein which is absorbed from the mucous surfaces of the air passages and apparently digests it. In this process the protein poison is set free, the tolerance for this is increased and non-specific immunity is established. The new recruit is becoming transformed into a seasoned soldier. In this transformation he acquires no specific immunity to measles and when exposed he acquires this disease quite as promptly as he would have done as a recruit. The measles virus is apparently digested and the protein poison set free, but on account of his increased tolerance the effects are mitigated in the seasoned man. We offer a like explanation

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for the well attested fact that the seasoned soldier bears influenza, pneumonia and probably many other infections better than the new man. The Typhoid Commission in 1898 found that preceding intestinal disturbances apparently gave some degree of protection against typhoid fever and wrote:

> The belief that simple gastro-intestinal disturbances predispose to typhoid fever is not supported by our investigations. As has been elsewhere stated, the members of this board began their investigations with the belief, which seems to be generally held, that acute disease of the gastro-intestinal tract render the individual more susceptible to subsequent infection with typhoid fever. However, our studies have forced us to come to the following conclusions concerning the relations between typhoid fever and preceding temporary disorders, including those diagnosed as diarrhea, enteritis, gastro-enteritis, gastro-duodenitis, intestinal catarrh, gastro-intestinal catarrh, gastric fever and simple indigestion: (*a*) The temporary gastro-intestinal disturbances of May and June had but little if any effect upon subsequent infection with typhoid fever. (*b*) The temporary gastro-intestinal disturbances of July and August instead of predisposing to typhoid fever, gave a certain degree of immunity against subsequent infection with this disease.

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THE ORGANIZATION, FUNCTION AND OPERATION OF AN EVACUATION HOSPITAL

By Major ELLIOTT C. CUTLER
Medical Corps, United States Army

INTRODUCTION

(One illustration)

THE following plan for the organization, function and operation of an evacuation hospital is fairly representative of that in use by many of our units of this type in France during the campaigns of the summer and fall of 1918. It largely copies that in use by Evacuation Hospital No. 3, Lieut. Col. C. M. DeForest, Commanding, during the month of October.

The chief function of such a hospital is that of evacuation. Much hinges on a realization of this. In addition, medical care should be administered to the maximum possible without conflicting with the chief function. Professional care demands a more or less lengthy stay in hospital following operation, and it is an accepted fact that the earlier surgical intervention can be given, thereby diminishing the chances of sepsis, the greater the number of recoveries and the shorter the period of convalescence. But these units must be more or less mobile so that the number of beds available will be limited by transportation facilities. An allowance of a thousand beds will be the maximum possible in the majority of such organizations. Therefore any scheme of operation must be so planned as to hold in hospital after operation only such cases as are absolutely necessary. Here the chief function of evacuation and optimum medical care conflict. And any plan must also prepare for the maximum intake which should not exceed one thousand cases in any twenty-four-hour interval provided the General Staff has had the opportunity to make provision beforehand.

The essential parts of this plan we have adopted from an experience that admits familiarity with the organization of similar hospitals in the French and British armies as well as in our own. It is elastic, provides for the handling of a large number of patients rapidly and, under excessive pressure, for the immediate evacuation by preoperative trains of such patients as a careful examination has considered transportable under the conditions imposed. This last provision we consider to be of the greatest importance. It has been our experience, both in British and American hospitals of this type, that under severe pressure, as when the twenty-four hour intake of patients exceeds one thousand, that the usual routine plan of work has been changed in order to handle the

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situation. Such last-hour shifts have invariably proven inefficient, and cases are often sent down the line without even a fresh dressing. In the following plan, provision is definitely made for just such times of excessive pressure, and we have had no fears of the ability to travel of unoperated cases which have been sent out under this arrangement. The chief factor is that all cases after admission are carefully examined and sorted by a competent person into the various channels available. Under this plan only cases requiring operation reach the operating tables, only those requiring X-ray reach the X-ray department, and all shock cases are sent at once to the shock ward. The time of the operating surgeons and the X-ray men is thus never wasted on cases that do not necessarily need their attention, and also judgment as to the future course and care of patients is rested in more competent hands than theirs. These sorting officers vary their distribution with the number of cases being admitted. Thus in times of great pressure, as during a costly advance or bitter defensive action, only the urgent cases reach the operating room, and cases which, in time of moderate activity, as fractures by rifle and machine-gun bullets without much bony destruction, retained missiles of this type and gutter wounds, etc., would be operated as soon as the few major cases were disposed of, are at once side-tracked, after being dressed, to the evacuation wards. These cases must be sent out on preoperative trains even if the base to which they will be distributed is twelve hours distant. For it must be remembered that, once a hospital of this type is 100 major cases behind, it will be almost twenty-four hours before the seven or eight teams, which was the normal allotment to such units, can operate and clean up this number of severe cases. Therefore, a preoperative train that takes even twelve hours will save the less severe cases ten hours of the interval before surgical attention could be given them in the evacuation hospital. Of course the evacuation and train authorities must understand that these cases are unoperated and that they should be routed through to the nearest available base with all possible speed. It unfortunately becomes a habit in our Medical Corps to criticise the use of preoperative trains, and their use by evacuation hospitals was with some officers taken as an indication of a lack of ability to handle large numbers of cases. It was simply an attitude due to false pride. Everything has its limitations and, when a hospital has reached its operative limit of professional care, if it can select suitable cases and get them to a hospital center long before its own surgeons could possibly find the opportunity to attend to such cases, surely it is wisdom to thus evacuate them. Preoperative trains must be recognized as a necessary and valuable part of the medical care of wounded. At times of excessive

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pressure there never have been enough front-line hospitals to give immediate and full medical attention to all the wounded, and in order to do so it would be necessary to create a ridiculously large medical corps forward.

All this impresses one with the fact that one must always prepare for the maximum intake. The plans of the internal organization cannot be changed at the last minute. Every officer and man must know his job thoroughly and must be kept within a field so limited that no matter how great the number of admissions, he can still perform his duties unassisted. For one cannot count on added personnel at such times, as everyone else who might be available is also in the same predicament. This necessitates efficient and carefully planned organization if the hospital is to be of continual use when the pressure from a maximum number of admissions becomes excessive. In army activities the importance of organization is even more significant than in civil occupations because of the terrible consequences of failure in the former. And those of us who previously did not fully realize this have, in the past two years, come to a full appreciation through bitter experience. Our own experience in the Medical Corps of twenty-three months in France was sufficiently full of such lessons. As a team operator this point was not appreciated, and we were led to think that the individual effort was of considerable importance, but later, when burdened with the direction of the professional activities in an evacuation hospital, the really small value of the individual was appreciated. When one realizes that an evacuation hospital may be receiving 1,000 cases a day during a period of great activity and that an individual surgeon, if doing major cases, at best will not go above 15 cases in his twelve-hour tour of duty, the lesson is sharply demonstrated. Again, the essential and prime requisition is that only those cases earnestly requiring operation receive such attention and that the available professional skill be expended on these only. I do not believe that we are ready to accept the attitude that the lightly wounded should receive the best attention, and that, before the less hopeful cases, on the basis that they will, if immediately cared for, be available for duty in the line again in a short time.

The plan presented covers the organization of the professional work chiefly. But the question of records is also of great importance, and essential data must be collected not only for the permanent records of the Government but for a better appreciation of the case at hand and so that its subsequent care may be better directed by a thorough knowledge of its past condition and treatment. There is no refutation of the criticism of our front-line hospitals about carelessness in this matter. However, let it be said, in justice to them, that the medical staff until

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the last month of the war failed to supply the forward areas with the field medical card in the necessary quantities, also that more advanced organizations, if they had them, often failed to collect the original data and send them down the line to evacuation hospitals on these cards. The improvised record begun in the evacuation hospitals was therefore usually on a poor quality of thin paper, which, however, was the only thing available, and even if pinned on, as all such records should be, was easily torn off and lost.

PERSONNEL

It is not our intention to enter into any detailed discussion in this paper of the purely administrative organization of such a unit. But so much of the success of such a unit depends upon the available surgical and medical skill that some enumeration of the necessary personnel must be given. Moreover, correct dispositions of such personnel is of prime importance. At once there is a natural division into the administrative and the professional groups. In each group will be found individuals who take almost no interest in the other group. This, however, is not wise, and all should, to some extent, understand the entire plan of organization. The purely administrative group is composed of the commanding officer, the adjutant, the mess officer, the detachment commander registrar and the supply officer or quartermaster. The enlisted personnel also should be considered as chiefly in this group, although certain of these will doubtless, because of special aptitude, always hold positions that will bring them into constant and close association with the professional group. Such will be the operating room orderlies, the X-ray, shock and preoperative ward orderlies. Roughly 250 enlisted personnel will be found necessary. The professional group should be headed by the Chief or Director of the surgical service. There may or may not be a Chief of the Medical Service. Personally I am of the opinion that two such chiefs are both unnecessary and undesirable reduplication. Evacuation hospitals should not keep medical cases one moment longer than is absolutely essential, and any medical officer, whether his training has been especially devoted to either medicine or surgery, who is of the type desirable as a surgical chief, should be able to settle best for the patient and the service how to treat and what disposition should be made of medical cases. Between fifteen and twenty medical officers should be supplied for a unit of one thousand beds. Among these there should be some with special training in eye, ear, nose and throat work. The other officers should be divided as to their special medical or surgical training about in the ratio of one (medical) to three (surgical). They should be young and active men who have graduated from a medical school within at the most eight or ten years. This type

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of man will learn rapidly the new type of work and will soon adapt himself to the new life and circumstances, no matter how varied and difficult they may become. From this group must be selected officers for day and night duty in the receiving ward, the dressing tent, for walking wounded, and in the preoperative or classification ward. If an excess of medically trained officers are present, two of them can be assigned to the receiving ward. The selection of the officers to be in charge at the other two sorting points ("triages"), the dressing tent and preoperative ward must be most carefully made. As will be brought out later, the men who fill these positions must have special qualifications, and on their shoulders rests great responsibility. The remaining officers, according to their experience and reliability, are assigned to the medical wards, to a special ward for cases of injury to the head, chest and abdomen, or to the wards reserved for postoperative cases that are to be detained or for cases ready for evacuation.

Also in the professional group there must be a dental surgeon, one or two laboratory officers and two X-ray officers. Provision must always be made for day and night shifts. The nurses, too, should be considered in the professional group, and for a thousand-bed unit thirty nurses will suffice, provided all attached teams bring their own nurses with them. If it is to be the policy not to have nurses sent as a part of operating, orthopedic and shock teams, then fifty nurses should be supplied as a part of the original personnel of all such units. From this must be selected a chief nurse and night and day shifts for the operating and sterilizing room in addition to the ward work.

The last components of the professional group are the various attached teams. These fall into three classes, viz., the shock teams, the splint or orthopedic teams, and the surgical or operating teams. All three are essential for the best care of the patients, and because of the necessity of special training are best supplied as temporarily attached rather than as a part of the permanent personnel of the hospital. It is hardly necessary to point out the vastly increased ability to concentrate rapidly, at any point, a large amount of especially trained people, under this arrangement. Shock and orthopedic teams should be supplied to evacuation hospitals in duplicate if possible, one set for day and the other for night duty; in the case of shock teams duplication is essential, but one orthopedic team may suffice.

An orthopedic or splint team is composed of one officer and two trained enlisted men. These teams proved of especial use in facilitating and speeding up work in the operating room. Their duty was to keep a supply of splints ready and apply them on the cases after operation. This meant much saving of time for the surgeons and saved many a pair of

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rubber gloves. Instead of breaking his asepsis entirely the surgeon turns over cases with fractures, when the operation ends, to the orthopedic team, which should apply the correct type of splint. The surgeon then changes his gloves and goes to work on the next case, which should be already anesthetized. In addition, this team keeps track of the available splinting material in the hospital, makes sure a supply is always on hand in the operating room and in the receiving ward for the exchange with the ambulances bringing in cases with a similar apparatus, and readjusts and applies splints in the wards at the time of subsequent dressings.

The shock teams are composed of an officer, a nurse, and one or two orderlies. They had been through a short but excellent course of instruction in the central laboratory at Dijon. Here they were given lectures on the theoretical nature of traumatic shock and the means of combating it, and experience in the practical technique of administering "gum" solution and performing citrated blood transfusions. These teams should be put in charge of the shock ward.

The attached surgical or operating teams constitute one of the most important groups in any such hospital. Their function is confined to the work done in the operating room. Teams should consist of an operator, an assistant (both commissioned officers), an anesthetist—who may be an officer or a nurse—a nurse and one enlisted man.

During periods of normal activity, with the division in the field, not less than ten teams should be attached. This will care for all the non-transportable and major cases provided the selection and "triage" of patients for the operating room is wisely and carefully carried out. This number of teams will accomplish between 100 and 125 cases in twenty-four hours when doing major cases only. As many as twenty teams have been attached to an evacuation hospital, but there was much confusion. However, under experienced guidance and administration, such a number of teams could be used to great advantage during periods of great stress.

Chiefs of teams should be carefully chosen. Experience during the present war has shown that the selection of men for team operators based on civilian reputation at home has been a failure. These men, necessarily those with a reputation, have often proven themselves inelastic and unable to learn rapidly, or to adapt themselves to the life and work in evacuation hospitals. Their physical endurance, also, has been insufficient. In times of pressure, in order to increase the number of available operators, teams may be split, providing an assistant has shown himself competent. It is not wise to increase teams by giving incompetent men charge of a team—far better to increase the number of

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unoperated cases to be sent away by train. To keep teams on duty eighteen hours with six hours for sleep, is better than splitting a team. Men who are of the right stuff stand this easily for the short duration of a push, and men who cannot stand this should not be sent up to this type of hospital for duty. It was an unfortunate fact that the U. S. Medical Corps continued to send older men up the line because of their professional standing at home long after the other warring nations had found out that these positions were always more competently filled by younger men. This, too, is not the only reason for the failure of the older men. They apparently were unable to adapt themselves to the new conditions both of life and work. The younger men learned far more rapidly and for that reason soon were far more trustworthy. They were less infinitely better soldiers, and, no matter what corps an individual is in, he must realize that he is a soldier and subject to rigorous discipline.

GROUND PLAN AND CHOICE OF SITE

Any plan covering the professional work of such a hospital finds itself at once greatly hampered or helped by the ground plan and actual position of the various component parts of the physical structures. It is essential that the various classes, primarily medical and surgical, be grouped separately: First, because the officers in charge are different; second, for professional reasons but imperatively, because the busiest part of the hospital is that dealing with the severely wounded—roughly all the surgical cases—and all these must be grouped about the operating, X-ray, shock and preoperative wards. For the same reasons and to reduce labor and to increase the speed and the ease of handling, all litter hauls must be reduced to a minimum. And, again, if we divide the surgical cases into the litter cases and the walking wounded, the wards for the walking cases can be on the periphery of the camp and those for the surgical litter cases grouped in the center. Further still, if the roadway is so constructed as to be at the back of the evacuation wards or near them, or the hospital set up beside the mean highway with this in mind, again the litter hauls will be reduced. Those who have seen, after a week's offensive, litter-bearers too tired to work will fully appreciate the value of this. The amount of space to be allotted to each group is of importance. Otherwise, when the push comes, one may find it necessary to put a freshly operated case into a medical ward—for example, a ward with pneumonia patients. The ratio of the space to be allotted to each varies with the terrain, the time of year, the type of fighting, and many obscure influences. But these must be worked out, and even the type of men in the division in the line must be con-

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sidered. Although the ground plan must always vary with the terrain, the water supply and the available permanent structures, the factors of separation of groups and of short litter hauls must always be kept in mind. The ideal evacuation hospital can better be constructed under tentage rather than by adapting it partly to buildings which may be available, because tents may be put where desired, the whole active working part of the hospital assembled in a very small area, and thus littler hauls brought to a minimum and evacuation facilities arranged for the maximum output with the least possible effort. Because of the influence each ground site will have on the ground plan to be followed, no definite design can be given which should always be followed. But the principle of grouping, and especially of the close assemblage of such structures as the receiving ward, preoperative ward, X-ray, operating, sterilizing and shock wards, must be and always can be carried into effect.

RECEPTION AND "TRIAGE"

The important functions to be performed and considered in any plan are those of admission, next of sorting, classifying and distributing the stream of patients ("triage"), and, lastly, of evacuation. Of the three functions that of the "triage" is the most important. It is the keystone of all the work and organization, and on the shoulders of the men directing this function rests the responsibility for the success of the hospital. In the plan presented there are three different points at which such sorting is done (3 "triages"), so arranged that no one place will become impossibly overcrowded. These are: (1) The receiving ward, (2) the dressing tent or ward in which the ambulatory wounded ("walkers") are cared for, and (3) the preoperative or classification ward to which all litter wounded go. The officers in the last two act as checks on the receiving officer, and, since all ambulatory cases that might be considered as necessary for operating or for evacuation on a litter are forwarded from the dressing tent to the classification ward, the officer in charge of the latter acts as a check on the second "triage." A further check is provided by the chief of the surgical service, whose advice should be obtained on all questionable cases. The plan is, after all, only a plan and, like any other, needs constant supervision and coördination. The chief of service, besides being in constant touch with all three "triages," must keep track of the evacuable cases, consider the necessity of preoperative trains, direct work in the operating rooms and shock wards, and arrange for the distribution of the more serious cases to the more experienced operating teams.

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THE RECEIVING WARD (THE FIRST "TRIAGE")

All patients are admitted here. It should be close to the road and large enough to hold twenty litter cases with some benches for walking cases. Spare blankets and splints must also be kept inside and a supply of litters near by, since, for every litter case admitted, a litter and the same number of blankets covering the patient admitted, as well as a Thomas splint, if the case is admitted with this apparatus, must be returned to the ambulance bringing in the case. A table with a typewriter are necessary for recording the necessary data. There must be one officer on duty by day and one by night. This officer makes only a rough and hurried separation, and this position need not require a man of wide experience. Except for the general benefit from the presence of an officer, a noncommissioned officer could fill this position. However, if that were true, there would be frequent calls for an officer to this point, as on the admission of a case dying in the ambulance on the way down and admitted dead, or a severe hemorrhage, or a question of valuables or arguments as to the return of litters, blankets, etc.; so that, unless the number of officer personnel make it impossible, a commissioned officer should be in charge of this point. He can, in addition, speed up the litter-bearers and generally make a quicker and more reliable distribution. He must ascertain, first, if the man is wounded; if so, has he had antitetanic serum? He must also see that the proper records are taken and that the time of being wounded and the time of admission are recorded on the back of the field medical card. This allows the surgeon to calculate the interval of hours since a patient was wounded, which is often of great assistance in forming an opinion as to how best to treat the case. If the man has not had antitetanic serum, a check is made on his card, and it is administered in the dressing tent or preoperative ward, where the correctness of this finding is again verified.

There are three channels to which the receiving officer may distribute cases: (1) To the medical wards, (2) to the dressing tent for walking wounded, (3) to the preoperative or classification ward. He does, of course, help by his professional judgment, and a case that is admitted walking may be sent by him at once to the third "triage." All of us who have worked in such hospitals have frequently seen more serious cases walk in than come in on litters. In one day I picked up, among the walkers, four cases with injuries to the brachial artery and no pulse at the wrist. Such cases must be tagged for immediate attention and examination in the third "triage." Cases in shock or with tourniquets must be similarly tagged. For convenience "gassed" cases may be classed as medical, and thus an added burden removed from the few and always overworked surgical officers.

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THE DRESSING TENT (THE SECOND "TRIAGE")

To this point are sent from the receiving ward all the ambulatory wounded cases except the few which the receiving officer sends direct to the preoperative ward because of emergency or the evident gravity of the injury. An officer is on duty in this ward by day and night. His duties are to examine, dress and make a record of each case. Cases which have not had antitetanic serum are given it here, and cases, which in the opinion of the officer in charge either require immediate operation or, if the pressure is great, can be evacuated but need to go as a litter case, are sent to the preoperative ward with a note in the field medical card of the opinion of this officer. The officers in charge of the dressing tent have great responsibility and should be of considerable experience. They must primarily realize that all walking wounded are not slight cases; they may require operation. Frequently large blood-vessel injuries of the arm find their way to this point, and even compound fractures of the skull may walk in. Cases that require X-ray pass to that department by way of the preoperative ward, so that the more experienced officer there may pass his opinion on the case as well. Each officer makes a note in the field medical card. This sorting point becomes, during battle periods, a very active place, and once truck loads of "walkers" begin to arrive there must be no hitch in the work here or the congestion will in a short time become confusion. However, with two nurses and two or three orderlies who have been trained, an immense number can be run through quickly, the officer passing judgment on every case. Also visiting officers, consultants, etc., can be used to most advantage here and with less disruption of the general scheme of organization.

After being dressed these cases pass to the wards reserved for this group, where a few orderlies will suffice for the policing and general guidance of the patients. Many of the patients will be found so slightly injured that they can feed and generally help their less fortunate comrades who may have arm, leg or hand wounds that render them less able to wash, dress and feed themselves. The officers who alternate on night and day duty in the dressing ward are also responsible for the future care of their patients until they are evacuated, and while the day officer is on duty the night officer must make rounds among these wards and examine any questionable case; also send back for redressing those cases needing it, or to the operating room or X-ray room cases that with time, or because of mistaken judgment, have proved non-evacuable without these procedures. Also, a case of pneumonia or other medical affection may turn up and need transfer to the medical wards, and it is essential that dysenteries and other infectious diseases be found out

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early and isolated. This may frequently happen when early preoperative trains cannot be had and cases are held over twenty-four hours. During the night the day officer must make rounds for the same purpose. It must always be understood by these officers that their separation and classification is entirely elastic. Thus during periods of moderate activity the surgical chief will keep them posted as to the activity in the operating room. If only a few major cases are coming in, it may be best to devote all the energies of one operating team to just such minor cases. It has been found that an experienced team devoting all its energies to such cases, if given two tables, can run through a very large number of cases in a day, probably up to thirty-five to forty cases unless a major case turns up. However, let it always be remembered that just this danger is of frequent occurrence, and a wise surgical chief will turn over such work to one of his most experienced teams. Again, during periods of comparative quiet, practically all cases can be diverted to the operating room, and it must always be uppermost in the mind of the surgical chief that all surgical teams must be kept busy, no matter how slight the cases. He regulates the number of unoperated litter and walking cases entirely on the available amount of surgical attention his team surgeons can perform, except, of course, for those chest and shock cases as in his mind have a better chance without operation. All officers in the command must thoroughly appreciate this factor of elasticity.

THE PREOPERATIVE OR CLASSIFICATION WARD (THE THIRD "TRIAGE")

All wounded cases admitted on litters pass from the receiving ward to this point. This class of patients constitute the bulk of the work in any evacuation hospital, excepting those hospitals given over to special work, and on their care fully 80 per cent of the available professional skill is expended. This is the first point in the hospital at which the important cases are diverted into various channels. The most experienced men on the staff should be stationed here, one for day and one for night duty. They are laden with great responsibility, and on their shoulders depends, to a very large extent, the reputation of their hospital as a useful unit. They must be capable of rapid work and judgment and thoroughly able to appreciate the constantly shifting nature of the standards by which they are to judge the distribution of cases. A generous supply of nurses and orderlies must be on hand even at the cost of ward or operating room assistance, for confusion at this point means general confusion. All patients must be undressed, if possible a bath should be given, their wounds examined and dressed, and they must be distributed into the proper channels for their future care. There are five channels into which these "triage" officers may direct cases, and let it be remembered

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that a mistake in judgment at this point may cost a life. To send a badly shocked case to a table for operation, to evacuate without operation a beginning gas infection, or to let a hemorrhage or tourniquet case get lost in some special ward may mean a death. If possible, except in cases of emergency, cases should be undressed in one tent, where a bath should be given when there is time, and then taken into another tent for examination and dressing of the wounds. This avoids examining wounds in a very dirty atmosphere, as all must realize is the case in any such undressing room. When one or two hundred men have had their clothing, covered with mud, blood and parasites, removed in a tent, no matter how excellent the policing and salvaging, the conditions for examining a wound are dangerous. Of course one can easily be contented with the assumption that already the patient has had his dressing changed several times under even worse conditions, which unfortunately is often true, but that does not excuse further soiling. Naturally the most severe cases are more cautiously treated and according as their condition dictates. If critical, their clothing will not be removed until under an anesthetic on an operating table or, if they are sent to the shock ward, not until their blood pressure is rising and their improvement warrants it.

Before entering upon a discussion of the distribution of cases from this point let it be understood that, though there are five different channels into which any case may be diverted, the condition of the patient is not the prime factor deciding this issue, but that it is the number of cases to be handled. Thus a day may start out with a few admissions, all of which naturally would be diverted into the operating room. Two hours later the results of an offensive may have pushed into the hospital 500 litter cases. This results in the changing of the standard of cases for operation from all litter and perhaps the more serious walking cases, into a very restricted class composed chiefly of abdomens, sucking chest wounds and fractures of the femur by shell fragments. Before this state has been reached the surgical chief should have ordered a train for preoperative cases to be followed by one for operated and other evacuable cases.

The cases may be distributed from this preoperative ward as follows; (1) To the evacuation wards; (2) to special wards for heads, chests and abdomens; (3) to the shock ward; (4) to the X-ray ward; (5) to the operating room.

1. The evacuation wards are those reserved for patients who are to be sent away from the hospital. Into them go such postoperative cases as, after operation, are judged fit to travel without further care, always with the reservation which the pressure of a large number of cases presents. Also into these wards in quiet times an occasional clean perforat-

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ing bullet wound may go or a convalescent case sent on down from field hospitals. But as the minute pressure is exerted by a large number of admissions and it is seen that the operating teams are getting hours behind the cases admitted, it becomes necessary to weed out more and more severe cases in the preoperative ward and to send them to these wards for immediate evacuation by preoperative trains—first wide-open gutter wounds, then retained bullets in addition to perforating bullet wounds, next, perhaps, fractures of smaller bones by bullets, etc., up the scale of major wounded until only cases are retained for operation of the most severe type, all others going to the evacuation wards to wait for a preoperative train.

2. Because of the gravity of wounds to the head, chest and abdomen, and for ease of handling them, it is better to set aside a special ward for wounds of this type. Both postoperative and preoperative cases are grouped together and an experienced officer put in charge. For convenience this ward should be placed next to the shock ward, but not under the same officer. We found that the true shock cases were always more than enough to use up all the time and energy of shock teams and, moreover, injuries to the head, chest and abdomen are not best treated by the methods of infusion and transfusion now used to combat traumatic shock. In addition, shock teams, though well enough trained at the base in the technique of this method, had little experience at first and could not be expected to act correctly if left to themselves. Thus, if head, chest and abdomens were put in their wards, they went ahead and transfused "gum" or blood in addition to giving heat and morphia. As a result much harm was done. To this special ward are sent direct from the preoperative "triage" injuries to the head, chest and abdomen of too severe a nature to undergo operation at that time. This requires much experience and careful judgment, particularly as regards head cases. For head cases as a rule do better, no matter how severe, if treated at once. A man with increased intracranial pressure which is probably increasing does not improve much under heat and morphia! In addition to these cases, perforating and a simple penetrating bullet wound of the chest, and cases with small retained pieces of shell in the liver, and non-sucking small chest wounds due to pieces of shell, are sent there for observation. In our experience only those chest cases that are sucking wounds or have large foreign bodies, or much bony injury, or those with transpleural diaphragm lesions gave the best result with immediate operation.

3. To the shock ward are sent all cases with a blood pressure below 100 as a fixed rule; other cases as the condition warranted. A large portion of these cases will be composed of fractures of the femur; the

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majority of the other wounds will be those cases of severe and multiple injuries.

4. The majority of cases under ordinary pressure will be sent to the X-ray ward, consisting chiefly of fractures and those cases with retained foreign bodies. Here the officer in charge will write his findings on the field medical card, and then the patient goes to the operating room. Space must be provided about the X-ray ward or in it for the accumulation of cases awaiting X-ray and for those after X-ray awaiting operation. And again an officer must be provided for night and day duty. Cases of simple wounds, when found negative as to foreign bodies, if there is much pressure, go at once to the evacuation wards to await evacuation, by a preoperative train.

5. The last direction into which this "triage" officer can guide the patients is that leading to the operating room. The cases which follow this course are usually exceptional cases, for whenever possible, even if it seems probable no missile is retained, an X-ray examination should be made. Thus, in the following sequence, unusual cases are directed at once to the operating room: (*a*) Those with active hemorrhage; (*b*) Those arriving with a tourniquet in place; (*c*) Certain cases of fracture without splinting. Cases admitted with hemorrhage will have had a tourniquet applied in the receiving ward, and those admitted with a tourniquet applied will, of course, have had this constriction released to see if bleeding continues, immediately on admission. Any one of these three classes may pass to the X-ray room first. Yet there will be exceptional cases in which it will not seem advisable to waste even minutes, and the "triage" officer must realize all the possibilities beforehand.

This "triage" is certain to be a very busy point, and there are innumerable duties other than the separation and classification of cases for the officer in charge to perform. Methods of warming patients must be liberally applied, morphia must be freely used and hot drinks and a little food given if much time is to intervene before the case is to reach the operating table. A further duty is imposed by the fact that such organizations must assume responsibilities for money and any article of value which patients may bring in. It has been our experience that losses have only occurred with patients who have been anesthetized. Therefore, those cases which are to be sent to evacuation wards to wait for preoperative train need not be relieved of their valuables. They are supplied with a cotton bag (comfort bag), into which all their valuable possessions go after being undressed and their wound examined, which they carry along with them. All other patients are relieved of their valuables, which are stored in bags and kept in a

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locked box. An able sergeant can care for this under the supervision of, and resting the responsibility with, the officer. The bags are ticketed, a check made on the field medical card, and later, on evacuation, the bag returned to the patient. In the case of death they are turned in to the proper authorities.

The enumeration of the above duties makes this position appear very difficult and responsible. It is, but if the work is well organized and enough assistance supplied in the way of nurses and orderlies and litter-bearers to distribute cases immediately a decision is reached, the point will not become clogged up and the rest of the hospital will be kept equally busy by an even distribution of the work to be done.

To sum up this most important part of the internal organization of the hospital, the sorting and distribution of cases, there are three points at which this work is done. (1) *The receiving ward*, where only a rough division is made into (*a*) the medical and "gassed" cases which are sent to wards, (*b*) the ambulatory wounded, and (*c*) the litter wounded; (2) *the dressing ward* for the walking wounded; (3) *the preoperative or classification ward* to which all litter wounded go. The success of the hospital pivots on the proficiency with which work is done at these points. Each point necessitates an officer for day and for night duty, and their importance increases from the receiving ward to the preoperative ward, but all these officers must thoroughly realize the elasticity of the rules by which their functions must be governed. Above all, provision must be made for a maximum intake. Attempts were made during the past summer to provide separate hospitals for non-transportables, seriously wounded and walking cases, and units were instructed as to which cases they should receive. Despite this scheme, experienced officers made provision for all three classes and when the pushes came off were prepared for what they received, a good deal of all three classes of cases. The attempt to thus specialize hospitals and group cases almost always broke down at times of pressure, probably due to the difficulties of satisfactorily sorting and "triage" at too advanced positions. To us it would seem better to keep the evacuation hospitals as general hospitals.

THE OPERATING ROOM

We have found that the French Bessonneau tent supplied to hospital organizations was admirably adapted to this function. A wooden floor, made in sections so that it can be transported and a table with one shelf running the entire length of one side of the tent, should be supplied and always carried along when the hospital moves its site. This table arranges for scrub-up basins and sterile instruments at regular intervals;

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the shelf below contains the packages of sterile gauze, towels, sheets, bandages, suture material, adhesive plaster, etc.; and the space beneath suffices to hold splints. Eight or ten tables are then spaced down the room near to the side on which the table is placed, leaving about a 4-foot passageway on the other or head end of the table for use by the litter-bearers. The latter should never be allowed to pass between the sterile table and the operating tables, and they must always go one way, the evacuation and postoperative wards, if possible, being arranged near the exit. Electric lights—at least two—should be spaced over each operating table, one of them being on a long cord for examination of wounds on the lower side of patients or for better lighting of parts distant to the fixed lights. Two operating tables should be supplied to each team; this, especially in the case of minor injuries, allows a team to get through a larger number of cases than if only one table were available, as the team now and then may split into two teams where the injuries are so slight as to render an assistant unnecessary, or at least a second case may be anesthetized while the first is being finished, thus keeping skilled operators always busy. With head cases there is the added reason that the process of shaving the entire head, which should almost invariably be done, is time-consuming, and that the local anesthetic can also be given while finishing one case, thus allowing the necessary interval for the anesthesia to reach its maximum power. The assignment of teams to duty is done by the surgical chief, who also may assign certain types of cases to specially trained teams. Thus the abdomens, heads and chest usually will be better done if confined to the more experienced teams. This proved to be especially true of the injuries to the head, very few men being found well trained in this type of work. As a result of this, a more disheartening opinion than was justified was prevalent as to head cases. In competent hands they did quite as well and often presented a higher percentage of recovery than the chest and abdominal cases. Changing teams every twelve hours proved more feasible than the eight-hour tour of duty. At least one half-hour, no matter how great the pressure, must be devoted at the end of every twelve hours to a thorough cleaning of the operating room. Very strict rules are necessary in handling these operating teams. They must stop promptly and begin promptly, and they must see that their orderlies clean their portion of the operating room when their tour of duty is finished. Local rules as to the suture or non-suture of wounds and as to the conservation of gloves, ether, catgut, etc., should be posted along with the assignment of teams to duty in the operating room. It is well, too, that they be ordered to have consultations before commencing joint resection or amputation.

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Surgical teams should not be given instruments or other professional equipment which renders them less mobile, causes confusion and delay in the operating room at the time of changing the night and day duty shifts, and constitutes often a grave danger of insufficient material at the active points. Sufficient material for at least ten teams should be carried by each hospital and, by thus pooling instruments, fewer are necessary for the same number of teams. We found that two sterile nurses, with all the available instruments boiled up and divided equally between them, could supply any number of teams working in a Bessonneau tent operating ward. The number of teams might run from four to eight, or even ten, depending on how many tables were allowed per team. At the time of change over of day and night teams an entirely fresh layout was always made, and as often between times as seemed advisable or an accidental break in asepsis rendered obligatory.

An orderly should be detailed as a "scribe" for each twelve-hour shift. As an operator finishes an operation he dictates a short note of his findings, and what he has done, to the "scribe," who enters the note on the field medical card. The last word of the operator's note directs the future course of that patient. He finishes with the words "evacuate" or "detain" according as to whether in his opinion the case can be safely evacuated without further care, or whether in his opinion it should remain for further care and observation in the present hospital. Of course it would be ideal to keep all cases, and during quiet times any questionable case can be held over, but as a rule the cases held over will only be those of injury to the head, chest, abdomen, most of the fractured femurs and such other wounds as seem liable to a severe infection. Cases in shock should be specially designated as such and sent at once to the shock ward, claiming precedence over all other cases when the question of available litter-bearers arises. In addition to writing the note in the field medical card, this note should be written in the operating room record book, into which the "scribe" should have already copied, during the operation, the name, number, rank, unit, calculated interval of hours from time of being wounded to time of operation, and time of being admitted to time of operation, diagnosis and the X-ray findings. The operator's name should be affixed to his note both in the field medical card and in the operating room book. The chief of the surgical service must keep his operators posted as to the pressure being exercised by the number of admissions so that more and more serious cases shall be designated "evacuate." If this is not done, the hospital will soon fill up with cases marked to be detained. Of course the chief of service in making rounds can change any of these

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at will, but he will save himself additional labor by always keeping the operators posted as to conditions, and then seeing that they carry out his instructions. Also, the surgeons will be kept happier if they make the designation themselves. Someone made the remark that team surgeons were like opera singers and needed to be handled with silken gloves. This was an unfortunate truth at one time, but, with experience and the appointment of younger men as surgeons, the difficulty lapsed. Deaths on the table should have their field medical card completed and at once turned into the sick and wounded office of the unit.

For convenience the X-ray ward should be on one side of the operating room and the sterilizing room on the other. This groups essentially interdependent parts. And if a Bessonneau tent is used for the sterilizing room it will be found that there will be room for the dental and laboratory departments in the same tent. Both of these latter departments should be in close connection with the operating room, the former because the dental officer may need a surgeon's assistance if attempting reconstruction or plastic work in his chair, or a surgeon may need him to help with a case of multiple injuries, one of which involves the jaws. The officer in charge of the laboratory must be always available for taking smears and cultures and reporting on cases actually being operated upon.

THE SHOCK WARD

For this purpose also a Bessonneau tent or British army marquee tent should be used. These can be kept fairly warm and dry in inclement weather and are better suited to hospital beds which, if available, should be used in this ward. To this ward are directed from the classification ward and without operation all cases with blood pressure below 100°. In the shock ward all the means of combating what we call traumatic shock are assembled: posture, heat, morphia, fluids and gum solution or citrated blood. If administered wisely and with the help of time, a great deal of good can be accomplished. When such a case has improved, his blood pressure is rising, and as further delay means increasing infection or a lost opportunity, the surgical chief must be consulted with. If he approves, the case should be sent to the operating room, where a table will have been held vacant for him. There must be no delay once this point is reached, and such a case takes precedence over all others except those of acute hemorrhage. In addition to such cases there is also the type of case which seems strong enough to stand operation, but which, through misjudgment or, more often, a prolonged operation, as is necessary with severe multiple injuries, goes

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into shock while under the anesthetic. Such cases should also be sent to the shock ward for resuscitation by the same means, or it may be necessary to transfuse the case while on the operating table. The shock team is available for this and also for transfusions on such cases in the special ward for heads, chests and abdomens as the surgical chief may direct.

The special ward for heads, chests and abdomens will contain both operated and unoperated cases and must be placed in the hands of one of the most competent officers available. As a rule, unless hopeless, the head cases should be operated as soon as possible. There has unquestionably been much confusion over this point and, at times of great pressure in some hospitals, only the slightest injuries to the head were granted space in the operating room because of a false opinion that they invariably succumbed and that, therefore, it was wasting time that could to better advantage be spent on other types of injuries. To any one conversant with General Wallace's report on abdomens, Colonel Cushing's report on heads, and Colonel Grille's report on chests, the fallacy of this opinion is evident. The fact is that it does take a special training to attempt this kind of surgery, and the adverse comment arose from the foolhardy attempt of unskillful operators attempting to work in this field. The abdominal cases as a rule must be attempted as soon as their condition warrants interference and, when it does, no time must be lost. But let it be remembered that often a perforating abdominal injury will recover without operation and in two weeks present two fistulae and a patient constantly gaining in weight and condition.

The chest cases will prove of most interest as to when to interfere. As we have already stated in our experience, immediate surgical attention is only indicated in a small group, namely: (1) Those with sucking wounds; (2) those with large bony injury; (3) those with large-sized retained foreign bodies, and (4) those with complicated diaphragm lesions. All others are sent to this ward for observation. Here they are set up, kept quiet and comfortable with morphia, and splinted by adhesive strapping as necessary. Their progress is closely watched. On indication they are aspirated and, if advisable, fluoroscoped. Positive cultures do not necessarily indicate operation. The general condition of the patient and the progress of the case must be taken into account. If those are favorable, operation is withheld, but a combination of *B. welchii* and streptococcus should, in our opinion, almost invariably be interfered with. Many, and indeed a large majority, of these cases will never need surgical intervention. Those that do need it should be carefully X-rayed. Then a thorough examination of the wounds should be carried out and a drainage opening established at the bottom of the

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cavity if the original wound will not accomplish this purpose. It will be found at fluoroscopy that in many cases, if the missile were originally embedded in the lung, it has dropped down and can easily be removed from the bottom of the cavity. Cases of injury to the head, chest or abdomen should be held in the hospital for at least ten days unless very exceptional reasons interfere.

The remaining wards are: (1) Those reserved for postoperative urgical cases which are to be detained; (2) those reserved for surgical cases awaiting evacuation; and (3) the medical wards. These should be divided up amongst the medical officers according to their abilities. Medically trained men will be in charge of the medical wards, and the better surgical men in charge of the wards in which cases are to be held for observation and further dressing. Here the question comes up of the responsibility for such cases. Many operators want to dress their own cases. For the good of the whole it is best that the ward surgeon be laden with this responsibility; otherwise, there will be a tendency for the ward surgeon to neglect his work and for the operator to order post-operative cases into the operating room for dressing, when fresh cases are waiting unoperated. It is, however, best to do difficult post-operative dressings in the operating room when possible, and, if the admissions are few, the ward surgeon can order many of his more serious cases into the operating room and notify the team surgeons on duty of his action. The original operator of the case may have been on duty the previous night; if not, he will naturally dress his own case, but by no means should a case be held over until the night duty people are available for such a measure. The patient must always come first.

The ward surgeons must enter notes in the field medical card as to the subsequent progress of his cases. In addition, they have daily morning reports to make as to the number and kind of patients in their wards and how many in each group, litter or walking, medical or surgical officers or other rank, are evacuable. New lists of patients ready for evacuation must be kept. If in any ward there are both evacuable and detained cases, two sheets can be kept, one for each type, and as new cases enter the ward they are entered on the proper sheet. Officers in charge of wards must also make sure that on evacuation all patients have had their valuables returned, and they must in addition see that a hot meal is served just before the evacauation takes place.

We have not gone into a discussion at any length of the methods of keeping records, nor of the equipment of these units. It is our desire to confine this paper to the actual professional side of the organization and operation of evacuation hospitals. However, it is so difficult to find the dividing line that even these subjects must be touched upon. The equipment originally issued was fairly satisfactory. The provision of

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tentage for inclement weather and special wards, as the operating ward, was insufficient, and this can best be furnished by the French Bessonneau tent. At least six of these should be supplied to each unit for use as operating, X-ray, sterilizing, shock wards and wards for the special class of head, chest and abdominal injuries. A certain number—at least ten—British marquee tents are desirable for the receiving ward, dressing tent, preoperative wards, nurses' and officers' mess and their quarters. Our United States army ward tent is unsuited to cold and rainy weather. Motors for the X-ray plant and to generate electricity should be furnished. At least two motor trucks, a small touring car and a motor bicycle, with side-car attached, are necessary for transportation. Enough instruments to supply as many operating teams as the capacity of the hospital requires should be carried, and a suitable mobile laundry is essential. For record keeping either of the following schemes may be followed. In our plan the data for forms 647 and 648 are taken on to a typewriter in the receiving ward on admission, one man reading off the information to another who works the machine. The evacuation reports are handed in by each ward at the time an evacuation occurs and the report consolidated in the sick and wounded office. Now that the reports must be arranged alphabetically, the admission data have to be rearranged at the end of each day. In the second plan a nominal list only was made on entrance and then two forms 52's were made out in the ward. One of these was returned to the sick and wounded office at once and furnished the data, after being alphabetically arranged for forms 647 and 648; the other copy was turned in when the patient was evacuated, being kept in his field medical card meanwhile, and could be easily consolidated for the report.

EVACUATION

The foregoing pages describe an organization which finally turns into special wards all cases that may be evacuated. These wards are: (1) All the walking wounded wards; (2) the evacuation wards for surgical cases, and (3) the medical wards. A daily report informs the headquarters office how many such cases are in hospital. When a train arrives, all such cases should be given a hot meal, and it should then be ascertained if they have their valuables, their records, etc. The litter litter cases usually are loaded first and the walking eases afterwards. For the smoother conduct of such evacuation it is well to have an officer and sergeant, with some assistants especially designated for such duties.

DISCUSSION

The chief function of evacuation hospitals is that of evacuation. The scheme of organization described is constructed on that assumption.

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It is extremely elastic and, though planned for a maximum intake, can at any time, without any change in principle, be so modified that in the event of only a moderate number of admissions the entire available operative skill may be kept working at its maximum. Necessarily it needs constant supervision and coördination, and most of this responsibility must rest on the shoulders of the surgical chief. He must be in constant touch with all three "triages," must direct and supervise the work in the operating room, as well as consult on all serious cases in the operating room, shock ward, ward for head, chest and abdominal cases, and pass judgment on the advisability of evacuating questionable cases. Most important of all, his relations with the commanding officer must be of the most intimate and mutually trusting kind. Their work will always overlap and coincide, and they are mutually indispensable to each other. Only when the harmony between these two offiecrs is perfect can the work done by their unit reach the maximum efficiency and usefulness. Beyond this, the establishment of friendly relations with the divisional and corps surgeons will be of advantage to all. From these officers transport and other material help may be had when necessary and also they can give warning of inpending activity. In return the evacuation hospital can furnish these chiefs with information as to how well their more advanced units are working. Thus, the arrival at the hospital of a large number of wounded who have not been given antitetanic serum, or fractured cases unsplinted could be immediately reported to divisional headquarters. It is only by this comprehensive correlation of effort that the best treatment can be given to the wounded man.

The personnel of such an institution should be composed chiefly of young men. They adapt themselves readily to the life and work in such new circumstances, they learn their new professional duties as well as their military position more rapidly, and they can stand the longer hours of work, the general physical hardships and the nervous strain without slowing up. And one must always have some reserve energy at hand in order to speed up when the exceptional push comes. From experience, we are wedded to the belief that this always does and will occur. Full provision for unforeseen events can never be made.

Although, above all, the hospital must be kept evacuated, let the condition of the individual patient be the guiding influence as to how his progress is carried out. Necessarily the scheme followed must be that which provides the most good for the greatest number, and this will in some individual instances be of serious consequence to single cases. But if the use of preoperative trains is wisely conducted, these individual errors will be less. The opinion that to send away unoperated cases was a confession of partial failure cannot be too strongly

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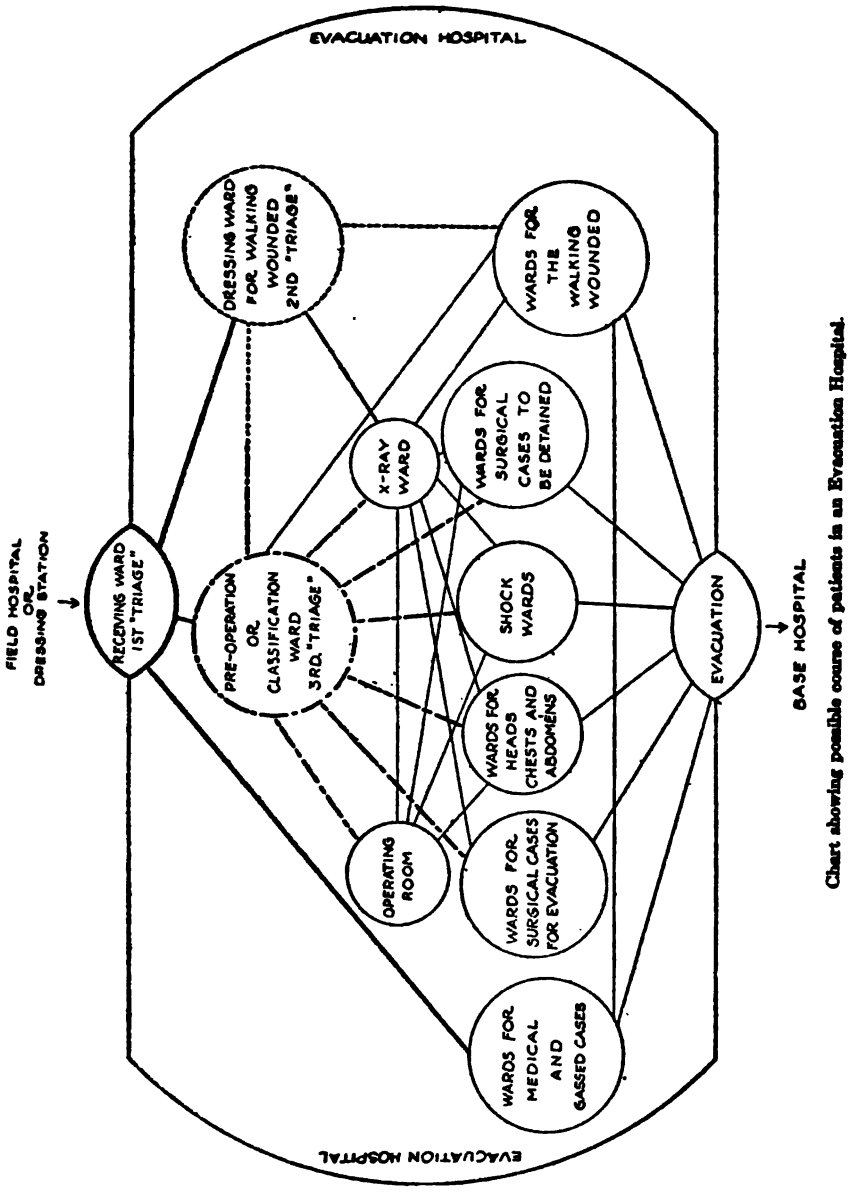
EVACUATION HOSPITAL
FIELD HOSPITAL OR DRESSING STATION
RECEIVING WARD 1ST "TRIAGE"
PRE-OPERATION OR CLASSIFICATION WARD 3RD. "TRIAGE"
DRESSING WARD FOR WALKING WOUNDED 2ND "TRIAGE"
X-RAY WARD
OPERATING ROOM
WARDS FOR SURGICAL CASES FOR EVACUATION
WARDS FOR MEDICAL AND GASSED CASES
WARDS FOR HEADS CHESTS AND ABDOMENS
SHOCK WARDS
WARDS FOR SURGICAL CASES TO BE DETAINED
WARDS FOR THE WALKING WOUNDED
EVACUATION
BASE HOSPITAL
EVACUATION HOSPITAL

Chart showing possible course of patients in an Evacuation Hospital.

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censured. In units where this opinion held, individuals were sure to be held over for operation until the interval far exceeded that which immediate evacuation to a base hospital area by su h trains would have taken. The use of young and vigorous personnel, competent plans for sorting and "triage" within the hospital, and the use of pre-operative trains constitute the most imprtant elements in the success and value to the army of evacuation hospitals.

SUMMARY

This plan provides: (1) For the rapid reception of patients; (2) for the separation into essential groups, giving the best professional services to a maximum number of patients at the time most needed, the type depending on the number of available operators, the emergency of the case, and the number of cases being admitted; (3) for the compilation of all the data necessary for hospital records and for the future care of the patient; (4) for the rapid evacuation of the hospital.

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PHYSICAL RECONSTRUCTION IN UNITED STATES ARMY HOSPITALS[1]

By Lieutenant Colonel HORACE M. EVANS
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THE experience of European nations who had been at war previous to the entrance of the United States into the conflict demonstrated the necessity for conserving man power. It was, therefore, necessary to adopt measures, first to restore men to military duty, or, second, to restore them to civilian life in a condition that would enable them to function to the highest degree possible. In order to accomplish these objects they inaugurated what is termed "Physical reconstruction," which was to be applied to men who had been disabled in the conflict.

Upon our entrance into the war we had the example of these foreign countries to enable us to adopt immediately a plan whereby we could conserve our man force to the best possible advantage. The Surgeon General of the United States Army established as a principle the following:

> That hereafter no member of the military service disabled in line of duty, even though not expected to return to duty, will be discharged from service until he has attained complete recovery or as complete recovery as it is to be expected that he will attain when the nature of his disability is considered. The inauguration of this continued treatment will result, during the period of the war, in the saving to the service of a large number of efficient officers and soldiers who without it would never become able to perform duty.
>
> Physical reconstruction may be defined as the completest form of medical and surgical treatment carried to the point where maximum functional restoration, mental and physical, has been secured. To secure this result the use of work, mental and manual, will be required during the convalescent period. This therapeutic measure, in addition to aiding greatly in shortening the convalescent period retains or arouses mental activities, preventing "Hospitalization," and enables the patient to be returned to service or civil life with the full realization that he can work in his handicapped state, and with habits of industry much encouraged if not firmly formed.

In order to meet these conditions there was established the Division of Physical Reconstruction of the Surgeon General's Office. This was done in August, 1917. On November 7 complete plans for the physical and mental rehabilitation of disabled soldiers, and for the reëducation of those injured so as not to be able to reënter their old occupations, were completed and forwarded by the Surgeon General to the Secretary of War. They are printed in Senate Document No. 173.

At the beginning there were several agencies making preparation

[1]Read by title at Annual Meeting of The Association held in St. Louis, Mo., Oct. 13–15. 1919.

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to take care of the disabled soldiers, and in conference with these it was decided that, during the time of the hospital residence of a soldier, physical reconstruction should be under the control of the Surgeon General's Office. After his discharge he would then be cared for by the Federal Board for Vocational Education in conjunction with the Bureau of War Risk Insurance.

On July 31, 1918, authorization was given for officers and personnel to care for the physical reconstruction work in the various hospitals. In August, 1918, a definite hand-book of instructions was sent from the Surgeon General's Officer to the reconstruction hospitals approved by the Hospital Division. This outlined the organization of the Division of Physical Reconstruction which is as follows: In each hospital that is to function as a reconstruction hospital there shall be a chief educational officer who shall have entire charge of all the activities pertaining to the educational work. In addition to the educational officer there are detachment men assigned as teachers, also civilians employed in the same capacity, and reconstruction aides not only give instruction in the wards to bedside patients but in the crafts room and shops. Coördinated with the work in occupational therapy there was a section of physiotherapy, under the head of the chief, with assistants and civilian employes together with physiotherapy aides. This division makes use of hydrotherapy in its various forms, the application of electricity in every form that may be used as a curative agent and massage, togethr with special curative exercise.

TYPES OF HOSPITALS

In applying the principles of physical reconstruction it is necessary to consider at least three types of hospitals: (1) Tubercular; (2) psychiatric; (3) general.

Tubercular.—In the tubercular hospitals physiotherapy has not been utilized as a restorative agent, and I feel that we have in many cases lost the assistance of a very valuable adjunct, particularly in those types of cases in which there is joint involvement, or in other types where elimination could have been improved by means of properly applied hydrotherapy, and also in other cases where the stimulating effect of electricity could have been used to an advantage.

In these hospitals the amount and kind of work to be done was most carefully assigned and guarded, because it was found that a very intense project might so excite the patient that it would cause a rise in temperature. Therefore it was necessary in the ward work to emphasize the less purposeful and perhaps more amusing projects. Later, when the abnormal temperature has subsided, tubercular patients

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furnish a splendid opportunity for initial vocational work. As they have all their limbs and faculties, they are capable of engaging in almost any kind of developmental work under the proper supervision. It was found necessary to have a larger staff in proportion to the number of patients in a tubercular hospital for the reason that the rest periods must not be interfered with, and, consequently, the hours for work were thus reduced. This, however, was not an objectionable feature in view of the fact that those who are engaged in instructing these patients should have more time for their own care than instructors in other hospitals.

One of the points that was emphasized in some tubercular hospitals was the graduated walk. This consisted in first attempting a walk of one mile. Only patients that were relatively free from abnormal temperature were permitted to engage in this walk, and the entire one mile consumed considerable time as it was arranged to have several stops on the way and frequently interesting talks upon subjects of interest were interspersed with the ordinary conversation at these rest points. Following a 1-mile walk would come the 2-mile and then the 4-mile walk, each conducted in a similar manner. The amount of good derived from these was entirely dependent upon intelligent supervision. One of the greatest benefits to be derived from these walks was that after a certain number of repetitions of a 4-mile walk a man was said to be able to do physical labor and could go into the shops, farm, school or green-house, this having a great psychological effect upon the patient.

A year's experience in these hospitals demonstrated the fact that, as a means of increasing the morale, which is a very important element in the restoration of these cases, there was no feature equal to the work done in the wards by means of the aides. This work, when properly performed, leads the man, as soon as he is able, into a more purposeful work, either in the shops or schoolrooms. Thus he is continuously encouraged and stimulated to carry on.

Psychiatric Hospitals.—The mental cases have required special study and skill in their care from the standpoint of physical reconstruction. Early in the work it was thought impossible to have any work done in what were termed "closed wards," and it was only in those cases that were less disturbed mentally that occupational therapy was introduced. After several months the aides became so skillful in their approach and development of the men that it was thought prudent to permit them to enter the "closed wards," and in these during the past months no man has been denied the assistance of these aides except those that were extremely violent, the results being most remarkable.

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It is very interesting to know how even a little thing may arouse a man who has not shown interest in life or spoken a word for months, and I recall one incident. An aide had such a patient outdoors, giving him the benefit of the fresh air and a walk and trying to find some method of arousing his mental activity. At this particular time she had a tennis ball which she threw at the patient. He expressed no more interest than simply to look at the aide. She then threw the ball and hit him with it, provoking a smile. Again she threw it and struck him on the side of the face. He immediately picked up the ball and threw it at her. This resulted in a game of throwing and catching which led that patient back into a mental condition that enabled him to take up work in physical reconstruction. This simple incident has been repeated many times in various forms, so that there is no way to tell in just what manner a patient may be aroused. As far as I have been able to learn, there has not been an occasion during all these months in which a reconstruction aide has been molested or disturbed by one of these patients, even in the closed wards.

Physiotherapy in Psychiatric Hospitals.—The application of physiotherapy to mental cases was very largely confined to hydrotherapy, and this was found to be a very great advantage in a large number of cases. It is true that electricity was used in specially selected cases, both for its tonic effect and for the psychological effect. Massage was limited to special cases, but a hospital of this type should be equipped to do the work in physiotherapy.

General Hospitals.—It is in the general hospitals that physiotherapy has had its greatest work, for in these hospitals we have all the types of cases in which these agencies can be of greatest value. From the very start, in every hospital in which the equipment has been installed, the work has increased both in efficiency and in amount, until the percentage of those in the hospital receiving physiotherapy has continuously grown. The most difficult task in relation to the work in physiotherapy has been to properly coördinate the different agencies that are active in restoring a man. First, it is necessary that the ward surgeons and nurses have a proper comprehension of what can be done in the way of assisting them in their work by means of physiotherapy and mechanotherapy. It has also been difficult, even after they have known of the advantages, to secure an active coöperation. Second, it has been difficult to secure active coöperation between the physiotherapy and the occupational therapy. One important point was the fact that where a certain definite result could be obtained by means of physiotherapy, if the same results could be obtained by occupational therapy, having the man use his own effort in restoring function, it has been

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difficult to have the transfer made from the passive effort of physiotherapy to the active effort of the patient himself.

THE EXTENT OF THE WORK IN PHYSIOTHERAPY

At the beginning it was thought to install equipment for physiotherapy in a few of the larger general hospitals, and that by transferring patients needing this work this could be centralized, but upon the signing of the armistice the men were returned so rapidly that it became necessary to extend this equipment not only to a great many general hospitals but to seventeen base hospitals, and we have had a staff and equipment in 48 different hospitals. The magnitude of the work can perhaps best be understood by the following summary:

REPORT OF PHYSIO-THERAPEUTIC ACTIVITIES FROM JUNE 2, 1919, TO AUGUST 18, 1919.

Week ending	*Hospital cases*	*Cases treated*	*Treatments given*	*Aides on duty*
June 2	31,958	10,046	76,495	705
June 9	31,001	9,843	79,667	715
June 16	28,861	9,758	76,805	696
June 23	29,415	9,184	77,452	676
June 30	28,985	9,341	77,215	620
July 7	28,110	8,104	56,923	592
July 14	27,010	8,247	63,038	576
July 21	24,773	7,755	65,622	536
July 28	24,386	7,242	63,835	529
August 4	23,241	7,330	61,340	524
August 11	21,472	7,365	60,270	525
August 18	20,484	7,129	58,759	525
Total			817,421	

The great number of cases and the aggregate treatments do not give a picture of the specific benefits which this work has brought in every hospital.

EXTENT OF THE WORK IN OCCUPATIONAL THERAPY

In the original plans a number of buildings for educational occupational therapy were to be erected in a few of the larger general hospitals, but it was found later that the demand was so urgent that it was not possible to construct buildings in time to meet the requirements. Therefore, additional hospitals were opened up, and seventeen base hospitals were included in the program of physical reconstruction. In these, additional hospital wards were converted into shops and schoolrooms, and ends of wards, or the verandas adjacent to the wards, were utilized as crafts rooms, and in this way the work was started without any great delay. There was more or less complete equipment in forty-eight different hospitals, and the commissioned and noncommissioned person-

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nel aggregated from 50 in a 500-bed hospital to approximately 200 in a 3,000-bed hospital, with the intervening hospitals proportionately supplied. The largest number of commissioned, noncommissioned, and other personnel in the educational part of the reconstruction was 2,321. The projects in the ward work consisted of work with textiles, wood work, reed and cane and fiber work, lettering, metal work, leather, cardboard and binding, and plastic work in pottery.

The academic work consisted of practically every subject that would be found in a complete commercial course, a high-school course, and some advanced work, including special instruction in several foreign languages. The shop work included courses in electricity, machine-shop work, complete wood-working instruction and many other subjects.

The highest number of patients in hospitals functioning in reconstruction at any one time was 66,640, and the largest percentage of enrollment in proportion to the population was 38. If you take into account the fact that in every hospital there was always a large number who were critically ill, or had had recent operations, or were suffering from contagious diseses, or were away on leave, you will find that the available hospital population was approximately 60 per cent of the total, so that 38 per cent of the total enrollment was 63 per cent of the available population. The total number of individuals that had been interested in educational or crafts work during the past year was 90,000. The total number of overseas patients admitted to our hospitals up to August 22 was 161,828. It is with these patients largely that reconstruction work has had to do, as the domestic patients were not hospital residents for any great lengrh of time. The greatest number occurred during the influenza epidemic, and, of course, under such conditions were not available for reconstruction work. The aggregate number of patients in the hospitals since September 7, 1917, is approximately 1,880,449. The following table shows the analysis of the men who have been S. C. D. from reconstruction hospitals from September to June:

	Sept	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Total	Per cent
S. C. D.—Unanalyzed...	280	226										
Hopeless	....	.....	22	8	17	14	41	13	5	15	135	.0087
Not in need further treatment	....	.....	376	505	562	1,329	4,519	2,045	2,408	2,485	14.229	.92
Unable to follow old occupation	....	.....	51	37	56	130	510	124	111	66	1,085	0.07
Total	280	226	449	550	635	1,473	5,070	2,182	2,524	2,566	15,449	

DEDUCTIONS FOR CIVIL INSTITUTIONS

The experience in United States army hospitals has demonstrated the value of physical reconstruction as a practical means of assisting in

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a more speedy recovery and a more perfect restoration of function and less tedious and depressing hospital residence, so that it would be the part of wisdom for every state to establish a central institution or institutions for the care (1) of the tubercular, (2) of the psychiatric patients and (3) general hospitals to take care of every other type of disease and injury. The experience has been that the larger the population in the hospital the less the pro rata expense, and this is true in the reconstruction division as well as every other.

The amount of work that should be undertaken depends entirely upon the amount of funds that can be escured and the character of the patients to be treated. Every single individual used in a well-balanced reconstruction staff is of value, and it can be undertaken with a small number of reconstruction aides with results commensurate with the expenditure and can best be administered with a complete staff of specially trained officers and aides.

Three points are of particular value. First, to secure a director who understands the work, who is in sympathy with it, and will give it the attention in detail that a successful work requires. Second, the securing of competent teachers and aides in the educational branch. Third, the securing of a specially trained man to direct the physiotherapy, together with the requisite number of skilled aides. As a general proposition the number of personnel can be rated from 10 per cent of the hospital population down to 5 per cent, keeping in mind the fact that the larger the hospital population the smaller the percentage of personnel required, as the patients can be grouped and one aide can serve a larger number when properly grouped.

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THE AIR MEDICAL SERVICE AND THE FLIGHT SURGEON

By Lieutenant Colonel L. H. BAUER and Major WILLIAM MacLAKE
Medical Corps, United States Army

TWO of the important medical developments of the war have been the establishment of a separate branch of the Surgeon General's Office to investigate and handle the medical problems peculiar to the Air Service, and the production of that specialized medical officer known as the flight surgeon.

The question naturally arises as to why there should be a special Air Medical Service, or why there should be a flight surgeon distinct from any other medical officer. In answering these questions we will make two statements and endeavor to prove them by describing the work of the flight surgeon, and how the work of the Air Medical Service in general differs from that of the Medical Department of the rest of the Army. These statements are:

1. The medical problems of aviation are new and entirely different from those of any other service.

2. The medical care of the flier can be carried out only by one with special training.

Before taking up either of these points it may be well to give the opinion of foreign medical services on this question. To quote from the *Air Service Medical*: "The British, French and Italians all stated early in the war that it is very fortunate that the air forces of the United States are profiting by the mistakes of our flying service, in recognizing at the beginning that the medical problem of aviation is a very special problem and cannot possibly be conducted except by an organized body of experts."

The advantages of a special Air Medical Service were first demonstrated by Great Britain. During the first year of the war her air casualties were caused as follows: Due to Germans, 2 per cent; due to defective planes, 8 per cent; due to physical defects of pilots, 90 per cent. They then established an independent Air Medical Service and specialized on the care of the flier. The next year the 90 per cent was reduced to 20 per cent and in the following year to 12 per cent.

When the United States entered the war it was decided to follow the advice of our allies, to select medical officers who were specialists in the branches mentioned below, and assign them to duty with the Air Service. It was discovered that we knew little or nothing about the medical problems of aviation, and in order properly to investigate these problems the Medical Research Laboratory of the Air Service was

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established at Mineola, New York. The laboratory was subdivided into seven professional departments, and each department studied the problems of aviation that concerned its own particular field. These departments are physiology, cardiovascular, ophthalmology, otology, psychology, psychiatry and physics.

The most important phase of the work to attract attention was the effect of low oxygen percentage on the circulation, respiration, mental reaction and the eye. The low-pressure tank was installed, which simulated the conditions from sea level up to approximately 36,000 feet. Later a rebreathing machine was developed which will be described later. Briefly, the subject breathes over and over again the same air with the impurities eliminated. The oxygen, of course, is constantly diminished, and the result is similar to that in the tank, for it was early found that the important factor in altitude is the decrease in oxygen percentage and that the decrease in atmospheric pressure and temperature were very secondary considerations. We will speak of these machines later in connection with the classification of fliers.

The specialized work of the Air Medical Service consists of three things: (1) The selection of the flier, (2) the classification of the flier, (3) the maintenance of the flier.

Now what line is to be drawn in the selection of the flier? First of all, it was soon discovered that the standard physical examination for entrance to the Army was not sufficient. One of the most important things for a flier to have is good eyes, and by good eyes we mean not only good central vision but good central and peripheral vision, good central and peripheral color vision, good ocular muscle balance, good depth perception, proper convergence and accommodation—all of which must apply equally to both eyes. Under the stress of flying, defects of muscle balance are quickly brought out. The ordinary individual on the ground is concerned chiefly with straight-ahead vision, and a slight weakness of one or more ocular muscles is not of importance; but the flier has to look in all possible directions, particularly in combat work, and that, added to the mental strain connected with flying, together with low oxygen conditions, brings out diplopia. It takes excellent stereoscopic vision to make a landing with an airplane, and the developing of diplopia at such a time will be fatal to the machine at least, if not to the pilot. Consequently we require 20/20 vision in each eye, perfect color vision in each eye (for it has been recently discovered that because a man has excellent color vision in one eye he does not necessarily have it in the other), and his vision and color vision must be good peripherally as well as centrally. The necessity to be able to see from all directions is, of course, apparent, and the necessity of having good peripheral color vision

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is particularly important in night flying because of the various colored lights that may be used around the landing field.

The question of depth perception or stereoscopic vision is important, as explained above. The old-fashioned hand-stereoscope was used originally, but this is a very poor test. It is more or less subjective, and there is a knack about it which many people with really good stereoscopic vision are unable to acquire. So a 6-meter steroscope was developed in this laboratory by Capt. H. J. Howard, and we require a depth perception of at least 30 millimeters, although experience has shown that the average man can do very much better than this.

The question of muscle balance is tested by the phorometer with the maddox rod and screen attachment. Not more than ½ degree of hyperphoria, 4 degrees of esophoria, and 2 degrees of exophoria are allowed. But the ruling on muscle balance is modified to a certain extent by the prism convergence and divergence. The pupil must be dilated and the fundus examined. Any abnormality of the fundus is a cause for rejection. Refraction of the eye must be done to detect latent hyperopia. The peripheral vision and color vision are tested by a self-registering perimeter.

All this sounds rather complicated, but we have shown, too, that any medical officer who has received intensive training in the making of this examination is able to do the work satisfactorily, and it does not require an eye specialist to make it. However, this special training is very necessary.

In the ear, nose and throat examination a normal nose and throat are insisted upon. Diseased or enlarged tonsils, or a badly deflected septum that interferes with free breathing, must be corrected. The condition of the ear drums must be healthy. Any perforation of the drum or discharging of the middle ear is a cause for rejection. Hearing must be of the 40/40 standard as tested by the watch tick, the whispered voice, and the coin test.

The question of equilibrium is a part of the otological examination. The sense of equilibrium is a most important factor in flying. A man who has not a very delicate sensing of motion is not fit to be a flier. This equilibrium test is made in the Jones-Barany chair, and the tests are made to discover the functioning of both the horizontal and vertical semicircular canals by the nystagmus, past-pointing and falling tests, and we must remember here that these tests not only give us the condition of the semicircular canals themselves but are an indication of the functioning of the pathway from the ear to the brain. Here, again, any medical officer can learn to do this test, but he must have a certain

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amount of special training and experience with it before he is ready to make a reliable examination. Whenever the chair test is unsatisfactory the caloric douche test is employed in addition.

The general physical examination is similar to that adopted in the special regulations for recruiting. The question of weight, however, is somewhat different. Roughly speaking, the minimum weight is 110 and the maximum weight 170 pounds, although variations from these weights are allowed if the candidate is evidently in sound physical condition and well proportioned.

In addition, a personality study is made of each candidate, and to make this examination the examiner must be familiar with psychiatry. Here, again, it does not take a specialist to make this examination, but only one who has had special training for this particular work. Our objects in making this personality study of the aviators are:

1. To detect nervous or mental diseases which may render the aviator temporarily or permanently unfit for the service.

2. To form a definite idea as to what extent the aviator will stand the pressure on arriving at the front.

3. To determine and, as far as possible, compensate for the existence of any latent tendencies which, under the stress of actual warfare, would become so accentuated as to make him inefficient and increase his danger of nervous and mental collapse.

The vital importance of such a determination of the personality trends and potentialities is seen in the fact that, aside from the disability arising from epidemics, probably 70 per cent of the cases of lowered efficiency among the aviators is due to a break, either partial or complete, in the nervous system. This condition we term "staleness."

The early recognition of the prodromal symptoms of such staleness of the nervous system counts everything as a means of prevention of crashes with their attendant injuries, and the maintenance of a high degree of efficiency in the Air Service. This, more particularly, concerns the flight surgeon in his care of the flier.

After we have the applicants selected (and only about 70 per cent of those that can pass the army recruiting examination are able to pass the aviation examination), we then proceed to classify them. This classification is based on the information which has been discovered at this laboratory by means of the rebreathing machine. First of all the aviator is given a general physical examination, including an examination of the eye. He is also given a personality rating. The state of nervous and mental fitness of the aviator, as determined from the nervous examination and personality study, is recorded as follows:

"A." Safe, nervously and mentally fit to fly.

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"B." Safe with limitations.

"C." Further investigation and special attention needed to determine and to preserve morale and efficiency.

"D." Questionable, no definite conclusion reached. Should be kept under close observation.

"E." Nervously and mentally unfit to fly.

The candidate is then given the rebreathing examination. The Henderson rebreather, which is the machine ordinarily used, consists of a steel tank with a wet spirometer at the top properly counterbalanced. The movements of the spirometer are recorded by means of a stylus on the drum of a kymograph. A Larsen respiration integrator records the volume of respiration in deciliters. On either side of the tank is a metal pipe. On the left side is the inspiratory pipe and on the right side the expiratory pipe. In the expiratory pipe is placed a cartridge of sodium hydroxide which eliminates the carbon dioxide of the expired air. There is a one-way valve in each tube which prevents the air current from going in any but the right direction. Both tubes are connected with flexible rubber tubes, which in turn are connected with the mouth-piece, the arrangement being somewhat similar to that of a gas mask. The tank is connected with a water supply, which allows flushing of the tank before and after examination, and which allows replacement of the oxygen absorbed, by water. The candidate sits in a chair in front of the tank, the mouth-piece is adjusted, and a clip placed on his nose. His left arm is free, and his systolic and diastolic blood pressures, his pulse rate, and his respiration volume are taken by observers every three minutes during the first fifteen minutes of the test and every minute thereafter. A clinician stands by and examines his heart at frequent intervals.

The effect of the low oxygen on his efficiency is determined by a psychological apparatus which is placed before him. This consists of a table on which are installed two rows of electric lights which are turned on individually in an irregular order at regular intervals, remaining lighted for two seconds. There are two rows of washers and screw-heads below the lights, one corresponding in position to each light. By means of a stylus the candidate must touch the screw-head corresponding to the light which flashes and must touch it before the light goes out. In addition there is an ammeter which is controlled by a rheostat under his hand which he must keep constantly at the same point, and this he does by moving the rheostat in the direction in which he wants the needle to move. Third, there is a motor with both high and low speed, which he is required to keep at low speed. The difference in speed is told by the intensity of the sound, a low-pitched sound indicating low speed and a

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high-pitched sound indicating high speed. This is controlled by a foot pedal which he depresses either with his toe or heel to change the speed. The psychologist sits opposite him and controls the ammeter and the motor. The lights are worked by an automatic flasher. The candidate thus has three things to attend to: First in importance, the lights; second, the ammeter; and the third, the motor. Particular note is made of the early effects on attention and motor coördination. When he reaches the equivalent of high altitude he begins to feel the want of oxygen. He responds in the ideal way by an increase in volume of respiration and by an increase in the pulse rate. In some cases there is also an increase in systolic blood pressure, but in the ideal case this does not occur, or at least not until the very end. His mental reactions become more sluggish. He begins to neglect first his motor, second the ammeter, and third the lights. Finally he becomes absolutely inefficient and is taken off the machine. After two or three big breaths he is practically normal again and many times asks why he was taken off, not realizing that he has been doing anything out of the way. The candidate frequently reaches what amounts to unconsciousness, without realizing it, and this is an unconsciousness of the nervous system *only*, as the circulation holds good. Of course, if he were kept on the machine, eventually his circulation would break. He may react in other ways. He may be taken off because he develops a heart murmur, because of an impending break in the blood pressure, or a fluttering pulse, but the great majority are taken off by the psychologist because of mental inefficiency. At the end of the run the air in the tank is analyzed to determine the exact percentage of oxygen. The man is then graded according to the action of his blood pressure, his pulse, his respiration volume, and according to his psychological reaction and the percentage of oxygen which he attained—in other words, according to the way he adapts himself to high altitude (psychologically) and according to the strain on this circulatory system.

The men are graded into four classes, and these classes are determined by the needs of the service. Class D are grounded, they being totally unfit to fly. Class C are allowed to fly up to 10,000 feet. This class usually shows some circulatory strain. Class B are allowed to fly up to 15,000 feet, and Class A to any altitude.

Combat work is done at a very high altitude, day bombing at moderate altitude, night bombing and and reconnaissance at a low altitude so that these classifications meet the needs of the service. Of the A, B, and C classes, about 61 per cent are graded A, 25 per cent B, and 14 per cent C. So by these methods we are able to determine, before a flier ever leaves the ground, the altitude to which he may fly safely.

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Let us quote an example of a flier out of condition. One flier at this field came here for a classification examination. He was rated Class "C." He made a very poor run. It developed that he had just recovered from an attack of influenza and was in a very run-down condition. He was ordered away on a month's sick leave and on his return was examined again. This time he received an "A" rating. If you put a flier on the rebreather who has been out half the previous night, he will make a distinctly poorer run than he will make after a night's rest. Fliers do not appreciate these things by themselves. They must be made to consider them.

Now we have our flier selected and classified for the work which he is to do. We are somewhat in the position of the man who has bought an automobile. The latter has his machine but, unless he takes care of it, it will soon cease to run. The same is true of the flier. The flier must be maintained in at least the class in which he was rated at his entrance to the service and, if possible, improved.

The aviator is subject to certain conditions to which the ordinary individual is not subject. While in the air he is subject to the effect of low oxygen. Furthermore, there is a mental strain while flying which eventually wears a man down. Then, too, the aviator is somewhat similar to an athlete. So long as the athlete trains a certain amount with proper recreation he can go for a long period, but if he is too intensively trained he becomes stale. Probably this analogy is not a good one, for an athlete becomes stale because of over-exertion physically, while the aviator becomes stale, not because of the physical work which he has done but because of the severe mental and nervous strain which he has been under. The nature of his work causes functional degeneration of his mental and nervous system. After prolonged flying without rest the aviator begins to do things which are unusual for him. He makes a bad landing. Perhaps he has a crash, and he begins to be afraid to go into the air. In fact, he may completely lose his nerve. If this keeps on, he will eventually become absolutely worthless as a flier.

The maintenance of the flier calls for the flight surgeon. He is a man who specializes in the care of the flier and is himself a flier. We may quote here the official statement of the flight surgeon's duties:

> The duty of the flight surgeon is to act as adviser to the commanding officer of flying schools and squadron groups. Although under the post surgeon, he has freedom of independent initiative in all questions of flying fitness of aviators or cadets. Subject to the approval of the commanding officer, he is expected to institute such measures as periods of rest, recreation, and temporary excuse from duty as may seem to him advisable. He takes sick call for aviators and cadets and recommends a disposition of cases excused from duty. He will visit such cases as may be in the hospital at the post and consult with the attending surgeon or physician regarding them.

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From time to time he will make routine reëxaminations of aviators and cadets, also such special examinations as he may deem advisable, being assisted therein by data furnished by the Medical Research Laboratory. He will live in as close touch with the fliers and cadets at his station as is consistent with the conditions.

Thus the aviators meet him on the flying field, at mess, in quarters, and during their recreation time. He is one of them, a flier as well as a "medico," and, while having the finest opportunity for observing them, soon becomes their confidant and adviser. The post-surgeon never sees them unless they are physically incapacitated and report at the hospital—this is usually too late so far as maintaining the highest efficiency of the aviator is concerned. Thus we see that, no matter how well qualified as a medical officer the post-surgeon may be, he cannot fill the place of the specially trained flight surgeon.

The flight surgeon should be in close touch with the commanding officer of the flying field and with the officer in charge of flying and the stage commanders, to be ready to advise them on all occasions, go around from day to day and inquire from them whether any particular man is doing anything unusual. If they tell him that a certain flier has been making bad landings for the last week, there is probably some reason for it which he can detect. He can make himself the most valuable man on the flying field, without exception, if he appreciates the possibilities of his position. On the other hand, he must remember that there will always be a few who will be invariably trying to get out of some unpleasant duty or to obtain sick leave. In granting sick leaves he must be cautious. The responsibility is his if he sends a man into the air who complains of being ill and who has an accident. On the other hand, it does not speak for efficiency if he grounds every man who comes to him at sick call. Thus the flight surgeon, by examinations and personality studies of his fliers, will prevent accidents.

Now a few more words as to the Medical Research Laboratory. Its duties can be divided intothree groups: (1) Research; (2) routine classification of fliers; (3) instruction of flight surgeons. Under (1) all medical problems of aviation are considered. To mention only a few of the subjects which have been investigated—the effects of low oxygen on the circulation and respiration from all standpoints, the reaction time of aviators at various altitudes, improvements of methods of examination and classification, dark adaptation, effect of tobacco on vision, the effect of altitude on the size of the aviator's heart, the effect of various diseases on the internal ear, the speed of accommodation, the judgment of distances, the effect of "stunting" on the internal ear, development of proper aviation goggles, investigation of the oxygen supply apparatuses, and numerous other points.

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To quote again from the Air Service Medical:

The greatest usefulness of the knowledge that "stunting" is an ear problem lies in the fact that the flier may be educated to disregard the vertigo effects of his stunts in the laboratory instead of among the clouds, and, without danger, acquire a tolerance to evolutions to a degree impossible in the air. This can be accomplished by the use of an otologic apparatus known as the orientator. In its construction it is like the cockpit of an aeroplane suspended in concentric rings after the manner of a ship's compass. The movements (or changes of position) which are possible in all directions except actual forward progression are governed by the individual seated in the machine using a set of controls resembling those of an aeroplane. Strapped in this machine he is enabled to execute any evolution, such as the loop, spiral, etc., at any desired rate of speed for any number of turns and thus acquire in absolute safety a tolerance for the disturbing effects of vertigo induced by these evolutions instead of acquiring this tolerance and knowledge by actual flying with its consequent crashes and possible loss of life. In addition, it will enable him to adapt himself to new and most unusual conditions.

A good deal of criticism has been directed against the orientator due to a misconception of its use. The idea has become prevalent that the orientator was intended to teach a man to fly. This is not the fact. A man will never learn to fly in an orientator. Nearly every flier with whom we have talked, who was opposed to the orientator, has shown on questioning that he entirely misinterpreted the idea of the machine. In each case where we have been able to talk to him at length and persuade him to try out the machine himself he has become a convert to its use.

"The orientator placed in the ground and flying schools will save many lives and machines, shorten materially the time of flying instruction, and develop a large number of stunt fliers."

Such an orientator is installed at the Research Laboratory. Its relation to vertigo is being studied, and it is hoped in connection with advice of practical fliers to develop a system of training for men just learning to fly.

The effects of rapid orientation upon the circulation are also to be studied. This machine, it is believed, will prove not only an apparatus for training but also one for research.

The examination and classification of aviators have already been covered in this paper.

Under (3) a school of instruction is conducted here to train flight surgeons in their duties. This training consists in lectures, demonstrations and practical work in normal physiology of respiration and circulation, and in the physiology of respiration and circulation of the aviator—lectures, demonstrations, X-ray interpretations, and clinical work on the heart. The ability to differentiate the arrhythmias and all types of valvular diseases is insisted upon. The effects of aviation on

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the heart are also taken up. The ability to make a careful nose and throat examination and to perform the equilibrium tests is also required. Lectures and practical work on the normal eye are given, and the ability to make a complete eye examination of the prospective aviator is necessary.

In psychiatry, the general field is covered by lectures and clinical work, and special attention is devoted to the making of personality studies. In psychology, elementary statistical methods, elementary psychological methods, and the psychology of aviation are covered. In physics, the consideration of oxygen supply apparatus, aviators' goggles, etc., is taken up. The course covers two months of intensive work.

We have endeavored to prove in this paper that the care of the flier is not so simple as it might seem on the surface. It is not an exaggeration, in our opinion, to state that the ordinary medical officer is totally unprepared to care for the flier or even to appreciate the medical problems of aviation without special training.

The longer a man is with the Air Service the more valuable he becomes, and the constant shifting of men from one branch of the service to another will not speak for efficiency. He should, therefore, not be transferred for other duty without very good reasons.

As the result of the experience of foreign armies, when we entered the war it was decided to start a special medical service for the Air Service. It is directed by a chief surgeon, whose functions combine those of a department surgeon and those connected with the special medical activities of the Air Service. Other officers are detailed to the Air Service and carried as unavailable for the rest of the service. This is as it should be; but it would be far better if these men could be considered as permanently unavailable for other duty rather than unavailable merely for the time being.

The research work of the Medical Research Laboratory can be carried on only by specialists. It will be far better for the Air Service if these men can be kept at their special work. It will not speak for efficiency if a research ophthalmologist or a physiologist who is thoroughly familiar with the air service work, and who perhaps understands the research end of it better than any one else, is called away from his specialty for general medical work or for foreign service or any other duty. It will be impossible to build up an efficient corps of experts unless, when once detailed to the work, they are detailed to it permanently. This, of course does not apply to everybody in the Air Service. Men doing the routine, hospital and sanitary work of an air service post can be transferred from one place to another, or at least from one air service station to another, and the flight surgeon can be transferred from

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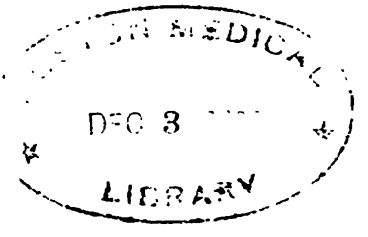
one air service post to another, although this latter should not happen too often because once a flight surgeon knows the men at his station and wins their confidence it is some time before a new man can reach the point in the work at which the former flight surgeon stopped. There is a tendency recently in the Army Medical Corps, once a man shows a peculiar fitness for laboratory duty or for surgery or for any other specialty, to keep him at that work more or less constantly, although of course he may have changes of station. The same should apply to the Air Service. Once a man demonstrates his ability in the air medical work he should be kept at it and not transferred to another variety of duty.



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BRITISH AMBULANCE TRAINS[1]

By Captain F. L. PLEADWELL

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(With eleven illustrations)

THESE notes on the subject of ambulance trains are based upon a number of inspections of both military and naval trains, in England and France, and upon extended observations made during two trips in a naval ambulance train[2] and one in a military train, actually engaged in transporting sick and wounded, as follows:

28 May, 1916: Inspection of Military Ambulance Train, London. (Great Eastern Railway.)

15–18 June, 1916: Trip on Naval Ambulance Train No. 3. (London-Plymouth-Gosport-Chatham.)

19 June, 1916: Inspection of Military Ambulance Train. (Waterloo Station, London.)

10–11 July, 1916: Inspection of Reserve Military Ambulance Trains. (Southampton Docks.)

19 July, 1916: Inspection of Naval Ambulance Train No. 4. (Edinburgh.)

6–7 September, 1916: Trip on Naval Ambulance Train No. 3. (Craigentinny, Scotland to Portland, England.)

7 October, 1916: Trip on Military Ambulance Train. (Dover to London.)

HISTORICAL DATA

The value of railways as a means of transporting troops and furnishing supplies has long been conceded, but these advantages are not greater than those of rapidly and safely evacuating the wounded from an army area. The war in Italy in 1859 demonstrated the value of railways to warfare, although only an imperfect organization had then been attained, and no organized ambulance train service was available in that campaign. In our Civil War there was instituted a Railway Hospital Service which provided for the rapid conveyance of sick and wounded to the rear. This service, however, came rather late in the war and did not reach a very high state of development. What was then accomplished, however, served to pave the way for further advance by Germany in the War of 1870. In that war elaborate arrangements were made for removal of the disabled by ambulance trains. These trains distributed the wounded to the various hospitals in Germany. As

[1] Read at the annual meeting of the Association of Military Surgeons held at St. Louis, Mo., October 13, 14, and 15, 1919.

[2] This naval train has been described in an article contributed to the *Naval Medical Bulletin* for October, 1919.

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soon as an army corps moved forward the wounded were transferred to the *Feld-Lazaret*, and every man who could be moved was taken to the nearest railway station, where he was placed in a train. The seriously wounded were moved from the train to hospitals situated in the towns nearest the frontier and their places filled with men who had previously been placed in these hospitals and whose wounds were healed to a degree permitting them to move on, and thus the wounded were transferred step by step from the battlefield to their homes. This system produced a favorable effect on the morale of the men, for any soldier knew when he went into battle that, if wounded, he would be conveyed home to be tended by his own people. This system largely eliminated the necessity for the field hospital, but it had some drawbacks. It presupposed the maintenance of a safe and regular railway communication between the army operations on foreign soil and the home country, but if lines of communication are severed, this system fails. After the striking object lesson of the Franco-Prussian War, a highly organized ambulance train service was included in the military organizations of the principal powers. Permanent hospital trains on the Continent were constructed so as to contain kitchen, pharmacy, storeroom, and wards for the wounded belonging to the lying-down category. Through-and-through corridor communication was afforded. In Germany they were known as *Lazaret-Züge*, in France as *Trains Sanitaires Permanents*, in Austria as *Sanitats Züge*, and in Italy as *Treni-Ospedali*. The establishment for an army corps varied considerably in the different countries, and the carrying capacity of trains also varied. British trains were first used in the South African War. In the recent war they reached a high state of perfection in organization and administration and contributed materially to the successful evacuation of wounded. Railway companies showed a commendable zeal in affording the War Office and admiralty officials every facility for providing these trains promptly and in making all necessary alterations to conform to the special uses for which they were to be employed. Generally speaking, all the trains provided by the several British companies were of uniform design, the vehicles being produced by a conversion of ordinary rolling stock, taken from main line traffic and altered to suit required conditions. A train has been turned out in ten days, and a naval train was actually finished in thirty hours. In instances like these, of course, existing material was utilized. Immediately upon receipt of a request from the War Office or Admiralty for a train, suitable vehicles were withdrawn from traffic and brought to the carriage shops, where necessary alterations were put in hand. This work of conversion and equipment was expeditiously performed.

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Two trains were made ready for service by the Great Western Railway, by August 14, 1914, ten days after the declaration of war.

Trains were operated both in home territory and on the Continent, and at least twenty-eight military trains and four naval trains were required in home territory for carriage of wounded from ports at which hospital ships evacuated wounded to hospitals in England and Scotland. The vehicles comprising these trains were made up of connected vestibule carriages of the latest type. Each train was provided with a pharmacy, treatment room, linen rooms, office, storeroom, kitchen, cooking appliances, hot and cold water arrangements, mess compartments and dining coach, and pantries and ward cars for officers and enlisted men. Some trains were provided with an operating room and some with a padded cell for mental cases. The order in which the cars or coaches composing a train was marshalled varied with different trains, but in general the central vehicles were designed to accommodate patients, those at either end being for the convenience of the staff and for stores. In military trains a pharmacy and treatment coach was placed between the ward cars. The detailed arrangements of some of the principal coaches of a typical train are shown in Fig. 1.

Some trains were arranged with cots in two tiers, and some with cots in three tiers. Ward cars arranged for lying-down cases are shown in Figs. 2 and 3.

Two methods were used of conveying lying-down cases in ambulance trains—the fixed bed and the movable cot, the former being exclusively used in all military trains. The naval ambulance trains had no fixed cots, using an ordinary service canvas cot stretched over a wooden frame holding a mattress, the whole being suspended from hooks in the roof of the coach and interchangeable. In some of the military trains the cots were interchangeable and could be used as stretchers, but they were not so employed to any extent. Where the cots are in three tiers, a coach will hold 36 patients when arranged for all patients to lie down, and 48 when arranged partly for sitting-up cases. Coaches with two tiers of cots accommodate 24 patients. The arrangement for sitting-up cases is made by removing the middle tier of cots, placing them at the back of the bottom tier, and taking the mattresses from the top tier and arranging them in the bottom tier to form couches on which the less serious cases can be accommodated. (See Figs. 4 and 5.)

Ample space was provided between cots to enable stretcher-bearers and attendants to pass, as to the operating room, and, when extra room was required, such as in loading up cots or cleaning under or about them, they were slung up against the sides of the vehicle. Each cot had woven wire springs, a mattress, and was hinged to the wall of the coach. Nu-

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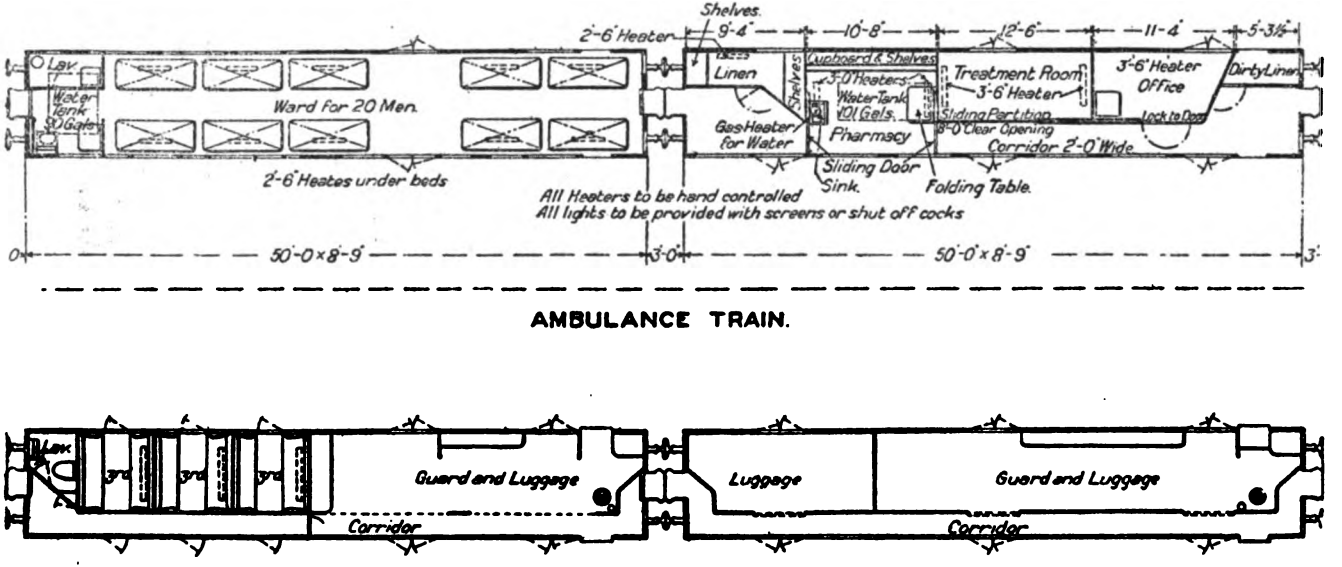

Fig. I. Details of Great Eastern Railway Ambulance Train. (Railway Gazette)

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merous types of cots were in use, and the details of some of the more commonly used may be seen in the illustrations. Access to and egress from the coaches was made easy by wide side openings arranged with sliding or folding doors. (Fig. 6.)

Trains were fitted throughout with electric bell communication, and some with telephone service between certain sections of the train. Some trains were lighted by incandescent gas lights, but many by electricity, the current being supplied from equipment of storage batteries fixed under the vehicle. The capacity of the batteries was such that they could supply light continuously for approximately twenty-four hours, even though the coach was standing still the whole of that time. When the train was running the lights were supplied with current direct from the generator, which was driven by means of a belt attached to one of the axles in each coach. By an ingenious arrangement of switches the lights could be varied at the wish of the attendants. For example, each of the ward cars was fitted with five fixtures contining two lights each, which might all be switched on, or so that there was one light in each fixture, or that the middle fixture only was lighted. Again, in each of the sleeping compartments for the doctors, nurses, sitting-up cases and attendants, the lights could be switched on full or dull, in the latter case there being merely a glimmer of light. Lights in the wards were fitted with green baize covers for the purpose of obscuring the lights when necessary. Those in the staff rooms were each controlled by a separate switch. The lamps in treatment rooms were generally of 25 c.p. and arranged to cause no shadows. Portable hand lamps were provided here and in the wards. Emergency lighting by lantern was also provided. Fire appliances and fire extinguishers were part of the equipment. Heating was by steam from the locomotive, or, when cut off, by steam or hot water from a boiler placed in a compartment in one of the coaches. Individual heaters were placed horizontally beneath the lower cots, controlled either collectively or singly. In the naval trains the steam radiator piping was run overhead the length of the train. In addition to steam heating in some trains, both the staff and personnel coaches often had a self-contained system of heating for use when the vehicles were standing without an engine. This arrangement comprised a series of hot-water pipes running the length of the vehicle above the beds and heated from a coal-burning stove placed in one corner at the end of the corridor. In connection with the heating system, a tank is fitted holding about 10 gallons of water, through which the heated pipes pass, and this provides a supply of hot water when the heating apparatus is in use. The floors of cars were coved at all angles and covered with linoleum turned up at the sides to prevent dust collecting in the skirting, the corners being filled

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with fillets for the same purpose. The floors of lavatories, operating, and treatment rooms were lined with lead to the height of about 3 feet and provided with drain holes so that they could be thoroughly flushed out. The treatment room in some trains had the walls above the lead lined with aluminum. The lavatories had a patent combination consisting of a water-sealed w.c. pan and water waste preventer. During short stoppages in stations lavatories were locked, but when a train had to stand some hours at stations or sidings outside closets had either to be used or buckets with dry earth and disinfectant placed under the w.c. pipes. Trains were fitted with dual brakes, vacuum and Westinghouse. with automatic communication throughout, to enable them to travel, if required, over any railway in Great Britain. Trains for the continent were fitted with coupling-up equipment for connecting to continental locomotives.

Electric fans were provided, and in ward cars they were disposed as follows: One fixed at each end of the car and one depending from the ceiling in the center so that a constant circulation of air was maintained throughout the ward, while portable fans were provided for use with cases of gas poisoning. The interior of cars was usually painted with water-resisting enamel white, which gave a light and clean appearance and permitted of the interior of the car being easily cleaned. In each of the vehicles a 6-gallon, securely locked tank was provided for drinking water. The character of the trains was indicated by a red cross on a white ground on each side of every coach, and in some trains a similar cross was painted on the roof so as to be observable from aircraft.

The utensils and general medical and surgical equipment of trains were supplied from the War Office or the Admiralty, ordinary train equipment being supplied by the railway company.

Ventilation was provided for by torpedo ventilators in the roof and sliding panels over each side light, giving a clear opening to the outside.

The general water supply of a train was contained in gravity tanks, independent of the water tanks for special purposes like drinking water, or for the pharmacy or kitchen. In a sixteen-vehicle train the total water supply ran from 1,800 to 2,353 gallons.

The pharmacy car contained the pharmacy, treatment room, office, stores for clean linen, etc., and a bin for dirty linen. It was fitted with cupboards, nests of pigeon-holes and shelves and racks for holding bandages, medicine, and surgical necessities, and a special rack for bottles. An earthenware sink was placed in this compartment for washing utensils. Above the sink in some trains is placed a 2-gallon urn, heated either by a "Primus" stove or by gas, for supplying hot water. This compartment was provided with a sliding door. Next to the phar-

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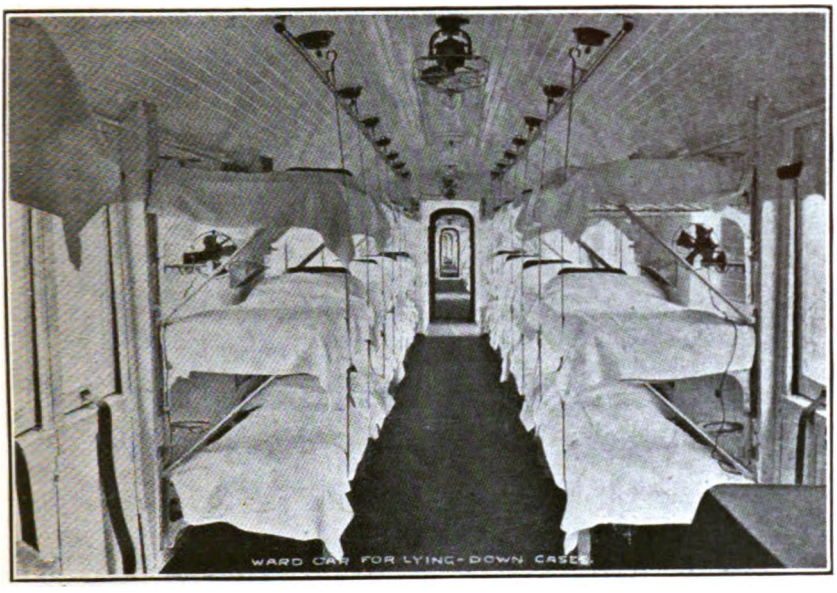

FIG. 2. WARD CAR FOR LYING-DOWN CASES. (*Railway Gazette.*)

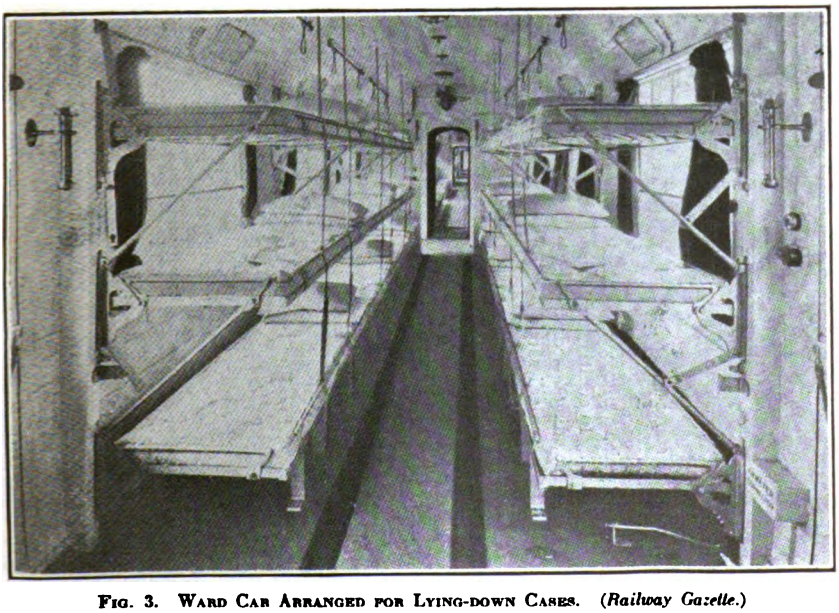

FIG. 3. WARD CAR ARRANGED FOR LYING-DOWN CASES. (*Railway Gazette.*)

(To face page 56.)

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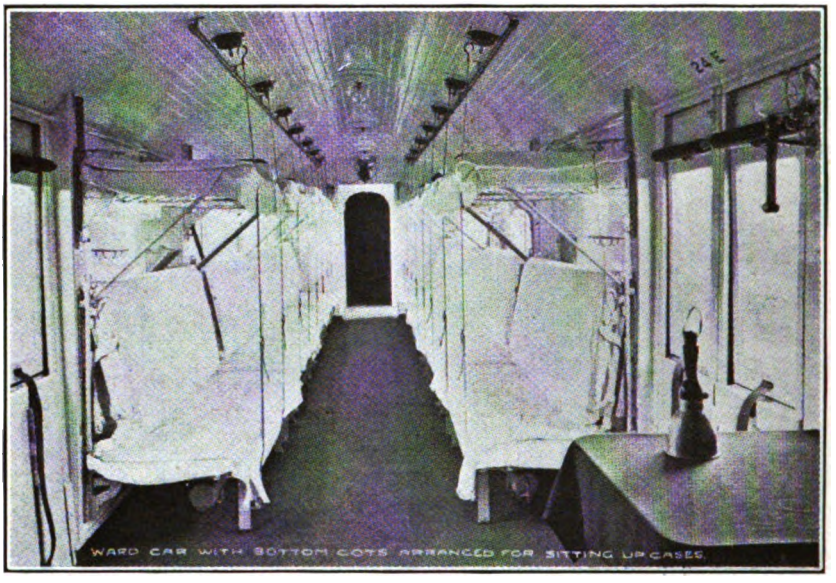

FIG. 4. WARD CAR WITH BOTTOM COTS ARRANGED FOR SITTING-UP CASES. (*Railway Gazette.*)

FIG. 5. WARD CAR WITH COTS FOLDED UP AND TWO BOTTOM COTS READY FOR STRETCHER USE. (*Railway Gazette.*)

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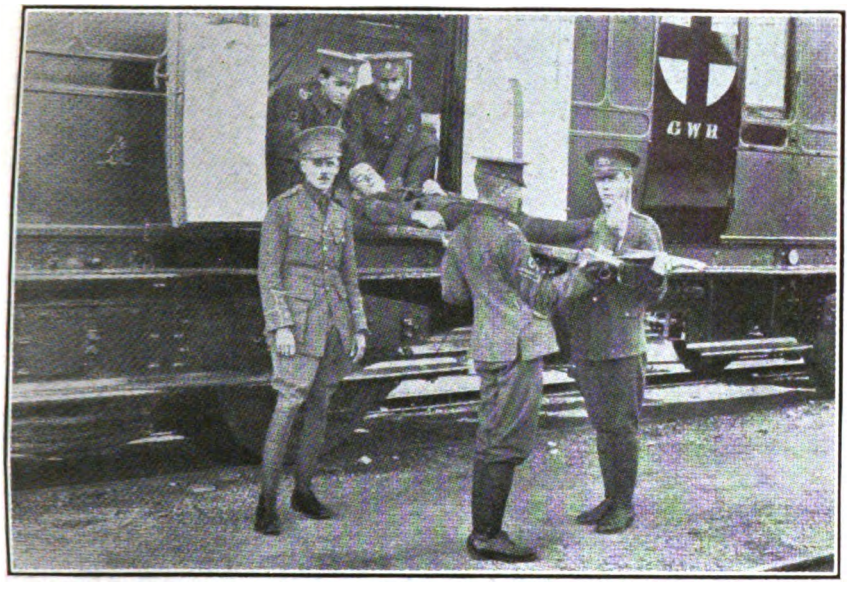

FIG. 6. GREAT WESTERN RAILWAY AMBULANCE TRAIN. METHOD OF LOADING WOUNDED MEN. (*Railway Gazette.*)

FIG. 7. PHARMACY CAR (*Railway Gazette.*)

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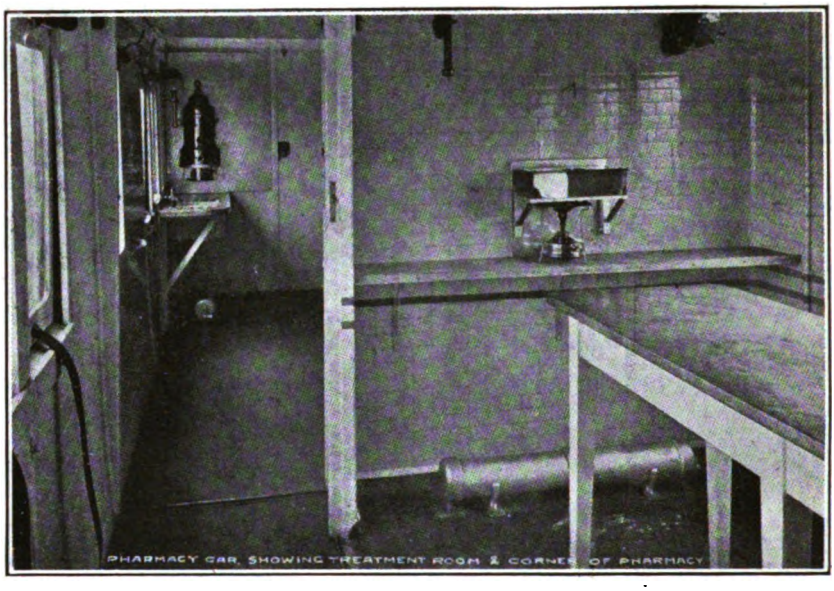

FIG. 8. PHARMACY CAR, SHOWING TREATMENT ROOM. (*Railway Gazette.*)

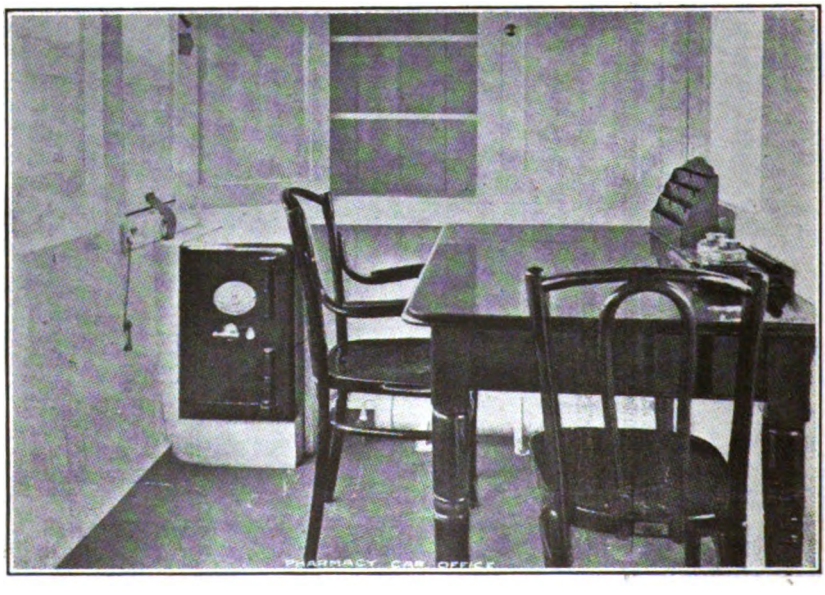

FIG. 9. PHARMACY CAR OFFICE (*Railway Gazette*).

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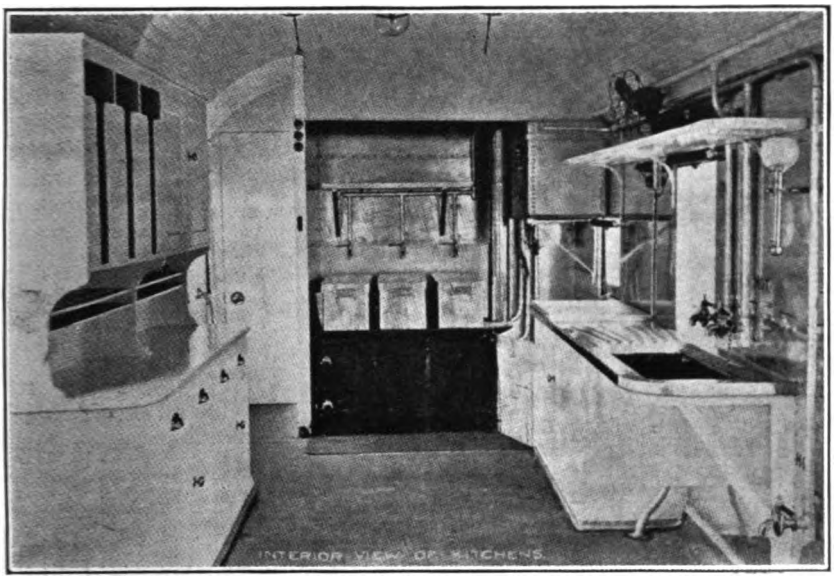

FIG. 10. INTERIOR OF KITCHENS (*Railway Gazette*).

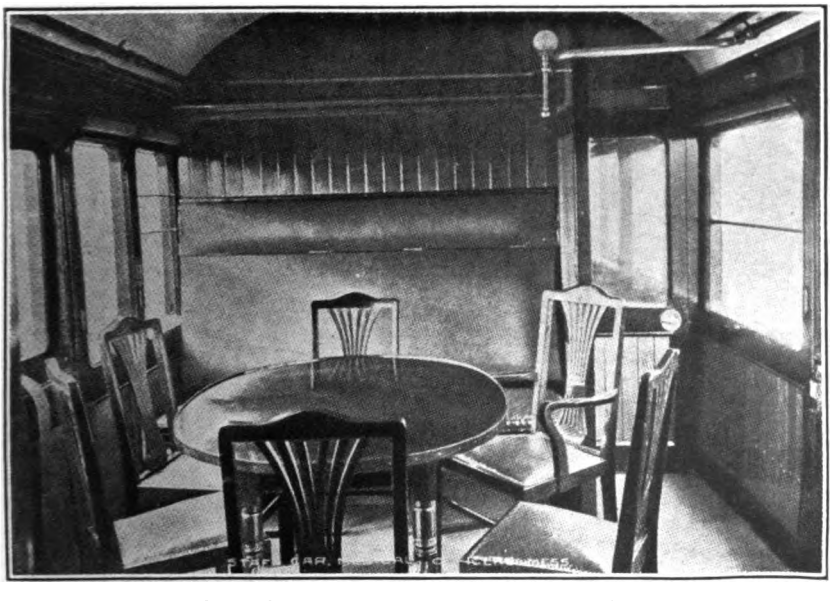

FIG. 11. STAFF CAR. MEDICAL OFFICERS' MESS. (*Railway Gazette.*)

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macy was the treatment room, which was provided with a bench for patients and with special doors to allow of a stretcher being brought in from either end of the train. A sterilizer for instruments was heated by a "Primus" lamp or by gas. The floor and sides of this room were lined by lead or zinc with drain holes in the floor. (See Figs. 7 and 8.)

The office was fitted with a desk, safe, lockers and cupboards, chairs, and in some trains a typewriter arranged on a disappearing platform was provided. (Fig. 9.)

The kitchen car was fitted with a cooking range, a dresser with cupboard, table, sink, and draining rack. Two types of ranges were seen, one known as the "Army Range," burning coal, and a gas range fitted for gas. Over the range is a hot-water tank holding 50 gallons. The interior of the compartment about the stove was lined with steel plates kept about 2 inches from the walls, the intervening space being packed with slag wool to avoid risk of fire. (Fig. 10.)

Next to the kitchen a small compartment was fitted up for cooks. The remaining portion of the car was sometimes used either as a men's room and stores for field units, officers huts, or for stewards store or pack store. A view of the medical officers mess in the staff car appears in Fig. 11.

SUMMARY OF MATERIAL DATA

Military Ambulance Trains.—The trains were made up of varying numbers of coaches from 9 to 16. Each coach was from 50 to 54 feet long and 8 feet 6 inches wide. The length of the train varies with the number of cars, from 477 feet in a 9-coach train to 939 feet in a 16-coach train. The weight of trains varied from 438 to 492 tons.

Summary of personnel data: Patients, 98 to 442; M. O's., 2 to 4; R. A. M. C. personnel, 8 to 34; nurses, 2 to 4; cooks, 3.

MATERIAL

Train	No. of coaches	Length of coaches	Width of coaches	Length of train	Weight of train (in tons)
No. 1, Gt. C.....	9	50	8′ 4″ 8′ 6″	477	.....
No. 20, Gt. E.....	16	54	.....	864	438
No. 4, Gt. W.....	9	.....	.....	.....	.....
No. 3, Gt. E.....	9	.....	.....	.....	.....
No. 2, Mid.....	10	.....	.....	481	.....
No. 8, L. N. W.....	9	.....	.....	.....	.....
Lanc. & York.....	16	.....	.....	939	492

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PERSONNEL

Train	Patient		Staff		
	Lying down	Sitting up	R. A. M. C.	Nurses	M. O.'s
No. 1, Gt. C.	50	50–100	18	2	2
No. 20, Gt. E.	162	280–442	34	4	4
No. 4, Gt. W.	Both 98–98		8	2	2
No. 3, Gt. E.	Both 100–100				
No. 2, Mid.	Both 100–100		12	2	2
Lanc. & York	144	256 plus 64 infections — 320	32 plus 3	4	4

Total, 530 persons. Total 638 if the cots in ward are used for sitting up cases.

My indebtedness to the managing editor of the *Railway Gazette* for permission to reproduce several illustrations and to utilize data respecting hospital trains appearing in that publication is gratefully acknowledged.

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CARE OF PENETRATING WOUNDS OF THE CHEST AT A BASE HOSPITAL[1]

By Major HUGH McCULLOCH, M.R.C., and Lieut. Colonel WALTER FISCHEL, M. C., U. S. Army

THE following report is based on experiences and observations made at British General Hospital No. 12, at Rouen, France. This hospital was taken over and staffed by U. S. Base Hospital No. 21 in June, 1917, and operated by them until January, 1919. The patients treated all came to us through the British line of communications. The great majority were men of the British armies, but during the summer and fall of 1918 we also received the wounded of those American divisions which were fighting on the British sector. We found no marked differences between the wounded of different nationalities in respect to reactions to similar conditions. The series of cases on which we base this report includes only those cases which were seen and studied by us in the year 1918. In 1917 there had been over one hundred cases of chest wounds treated in our hospital, but as they had not been studied or handled in the same systematic way we have not included them in this report.

In considering our statistics it should be remembered, too, that all of these men came to us after a railroad journey of from eighteen to thirty-six hours. We very rarely saw a man whose chest wound was less than forty-eight hours old. Also, it is only fair to state that the worst cases theoretically were kept at the casualty clearing stations.

During periods of great activity we could not retain our cases as long as we might have thought wise, so it is possible that some of our patients may have died after reaching England. We heard of only one such, a man who left us in very good condition but with a fairly large piece of shell fragment imbedded in his lung. He died of hemorrhage soon after arriving in England.

The results which we obtained in the handling of our series of cases seem to have been somewhat better than was the average among hospitals similarly situated. In going over our records from time to time we checked up on our methods to see if we were following any peculiar or special line of treatment. Always we came back to the conclusion that each case must be considered by itself and the treatment adapted to meet special requirements. As our experience grew we certainly became more conservative in advising surgical interference. Yet when radical measures seemed indicated to us we urged them immediately.

[1] Read at Annual Meeting of the Association at St. Louis, Mo., October 13 to 15, 1919.

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Figures may mean much or little depending on their interpretation. The following are stated in order to give an idea of the work done.

Total number of patients with penetrating wounds of chest in 1918	539
Total number of deaths	44
Percentage mortality	8.16
Number of patients with wounds penetrating chest and diaphragm	57
Of these there died	14
Percentage mortality	24.6
Number of patients with wounds of chest and complete severance of spinal cord	8
All died. Percentage mortality	100
Excluding complicating wounds of diaphragm and spinal cord we had of chest wounds alone	474
Of whom there died	22
Percentage mortality	4.64

On admission to the hospital all chest cases were segregated in special wards. After the long and exhausting journey we found that the best treatment for these men was a warm bed and a few hours rest. As soon as possible after admission all the patients were examined by one or both of us and a tentative line of treatment planned. Men who *looked sick* were examined first. If they had been operated on at the C. C. S., their wounds were inspected. Frequently we found that wounds which had been sewed tight at the C. C. S., were sucking when they reached us. In these we cut sutures and inserted drainage tubes at once. Others had remained tight, but examinations showed signs of fluid. These were aspirated at once and the fluid obtained examined under the miscroscope and by culture. At first we advised opening the chest in all cases where we found infected fluid. Later we found that in some cases by repeated aspirations we could control the infection.

All cases which showed even suspicious signs of fluid were aspirated. If the fluid were found, we withdrew all we could get, and the aspiration was repeated in twenty-four or forty-eight hours, depending on the character of the aspirated fluid and the condition of the patient. All fluids were examined for bacteria. In all we had 407 cases with hemothorax, and of these 326 remained uninfected. Of the other 81 cases, 73 were operated, and in eight we were able to successfully combat the infection by repeated aspiration. In these 8 cases the invading bacteria were: gas bacillus in 2 cases, pneumococcus in one case, staphylococcus in one case, and streptococcus hemolyticus in the other 4.

In our series we had a total of 135 patients in whom a thoracotomy was done, with a mortality of 26, or 19.2 per cent. Not all of these were operated in our hospital, in fact 88 had been operated at the

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casualty clearing stations. Of these 34 required a second operation in our hospital, and 7 of them died. The remaining 54 had been operated and closed up at the C. C. S. and did not require secondary drainage.

We were firmly of the belief that more of these cases would have come through without drainage if they had all been systematically aspirated for several days following the primary operation.

Of the cases which were operated for the first time in our hospital, 47 in all, 19 died, a mortality of 40.4 per cent. This high mortality we feel was due to the fact that all of these cases were operated late and at a time when the entire pleura was badly infected. In only three cases was it thought advisable to close the wound after removal of the foreign body and toilet of the lung and pleura. In two of these three it was necessary to reopen and drain.

In the care of the patients who had been drained there were several points which seemed to us of importance. We insisted that the patients should change their positions in bed, and set them up for periods each day. In this way we felt we secured better drainage of the pleura and also favored expansion of the lung. Especial care was taken of the diet and every effort made to build up the state of nutrition. We noticed that the grouping together of similar cases seemed to have beneficial effect. Each man watched the progress of his neighbors, and they all cheered each other on.

The drainage tubes had to be adjusted to the needs of drainage, as a tube too long or improperly placed acted as an irritating foreign body. In one case of long continued pleural infection with pocketing we finally succeeded in cleaning out all the pockets by using a cystoscope to properly place our tubes. We used irrgiation of the pleura with eusol or Dakin's solution only under special conditions. Our conclusions were that irrigations were indicated in cases in which a sluggish state had been reached with low-grade temperature, continuous drainage, tissues showing no response. In these cases, after a few days of irrigation, the condition was improved; however, we found that the irrigating fluids themselves might prove irritating if continued too long.

We are not prepared to state our opinion on the value of irrigations in cases which had not been opened. Our experiences were too limited. But our impression is that it is not necessary. The cases did well if the pleural cavity could be cleared and kept clear of necrotic tissue and blood, either by aspiration alone or by primary opening with complete toilet of the lung and pleura, closure and repeated aspirations. Again and again we come back to the importance of repeated aspirations.

Occasionally we encountered cases in which physical signs and X-ray both indicated the presence of blood in the pleura but repeated aspira-

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tions were negative. In these cases we were dealing with extensive blood clots. Our procedure was to watch the general condition. If the patient were doing well, we left him alone, but if he showed symptoms of severe infection, we advised operation to clean out the entire pleura.

In general we noticed that the character of the wounds and the severity of infections varied with the type of the battle actions. During March, 1918, at the time of the great German offensive and the allied retreat on Amiens, the cases came to us in very bad shape, due to the disorganization of transport and the general depression of the troops. The cases often went as long as three days before receiving proper medical attention. Later in the dry summer months, with the change from retreat to advance, the conditions were much better, and our cases were as a rule much less severe.

The worst wounds were those caused by airplane bombs. They were always associated with extensive laceration of the chest wall and were badly infected.

Large shell fragments were next in seriousness. Rifle and machine-gun bullets caused the least dangerous wounds. They were usually through and through and rarely carried in much infection. Shrapnel balls occupied a midway position; if they did not shatter ribs, they seemed comparatively innocuous.

We have not attempted to describe the surgical procedures in the cases treated by operation. Neither of us is a surgeon, and we turned over that side of the treatment to our surgical confreres. We are convinced that, as seen at the base, penetrating wounds of the chest belong under the care of a trained medical specialist but with the constant consultation of an expert surgeon.

We feel that much of the credit for the good results obtained in our cases belongs to the surgical assistance we always had. Lieut. Col. M. B. Clopton and Maj. W. M. Rainey followed our cases with us and skillfully took care of the operative procedures. We also owed much to the medical and surgical consultants of the Rouen area, Colonel Pasteur, R. A. M. C., and Colonel Dunhill, of the Australian Army Medical Corps. In their frequent and regular visits they gave us much helpful advice on doubtful cases and also kept us informed of what others were doing.

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MUMPS: A REVIEW OF OUR KNOWLEDGE CONCERNING ITS ETIOLOGY, MODE OF TRANSMISSION, INCUBATION, AND PERIOD OF INFECTIVITY[1]

By CONRAD WESSELHOEFT, M.D.
Late Captain, M.C., 102d U. S. Infantry

THE importance of mumps is not generally recognized by the medical profession. The average practitioner is apt to consider this malady among the milder children's diseases, such as chicken-pox and German measles. In the medical schools mumps is usually accorded a few brief remarks from the department of pediatrics, and text-books are apt to reflect the common idea of its unimportance by recording meager generalities. The civilian practitioner may be justified, to a certain extent, in looking upon this disease with a degree of indifference because of its comparative mildness and rarity of occurrence, with the proportionately few complications and sequelae which come to his notice. To the army medical officer, however, mumps presents a very much more serious aspect. An epidemic of mumps in a unit of the army may temporarily deplete the ranks as seriously as other more formidable diseases. Common colds, or even German measles, might run themselves out in a command where the cases continued on full duty without any serious depletions from complications; but with mumps full line duty is usually too much for the acute stage, and, furthermore, the relatively high percentage of complications demands hospitalization, not only for the welfare of the individual patient but equally for the working efficiency of the unit. From the standpoint of the surgeon with troops, therefore, the problem of dealing with mumps demands the fullest attention to modern researches and inquiries on the subject, and these could well be utilized to advantage by the practitioner or hospital internist. As a former surgeon with line troops, and as a visiting physician to a contagious hospital, the writer has attempted to clear his mind of certain vagaries regarding the disease which have been a frequent source of perplexity and vexation in regimental work, and in dealing with boards of health, and to bring the more practical considerations of the subject up to date.

A review of the literature has brought out certain features which may be of interest and of help to medical officers. In the first place, the greatest interest in mumps during the last fifty years has been displayed by army medical officers. The contributions to the study of

[1] From the Evans Memorial for Clinical Research and Preventive Medicine, Boston, Mass.

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this subject emanating from military institutions outweigh in practical importance the contributions from all other sources. During our own Civil War 48,128 cases of mumps were reported, with 72 deaths [1]. There were 19,458 cases in the French Army during the years 1888, 1889, and 1890, with no deaths [2], and from 1888 to 1892, inclusive, there were 33,745 cases [3]. In the nineteen army corps of the German Army during 1898 amd 1899 there were 486 cases with two actual epidemic outbreaks of 67 and 83 cases each [4]. The disease is said to have been epidemic in the Second Balkan War, but no statistics are available.[2]

Throughout the European War mumps has played an important rôle in the great armies. It began in the fall of 1914, and, like other epidemic diseases along the front, invaded the mobilized armies of the neutral countries [8]. Captain [9], of the French Army, made observations on 700 cases at the hospital at Bégin between 1914 and August, 1918. Captain Orr [10], of the Canadian Army Medical Corps, records 902 cases out of 18,000 men passing through the camp at Surrey between December, 1916, and May, 1917. At Camp Wheeler, Georgia, from October, 1917, to March, 1918, there were 5,756 cases of the disease, an incidence of 32 per cent in the command. This epidemic in the 31st Division, described by Lieutenant Radin [11], is estimated to have cost the Government approximately $1,000,000.

Previous to the outbreak of the war, however, the literature contained a relatively larger number of observations on mumps in adults, where the complications attracted unusual interest. Hubbard [12] informs us that 3 to 5 per cent of deaf-mutism originates from mumps. In other words, of the 50,000 deaf mutes in the United States in 1915 approximately one to two thousand owed their condition to this disease. Orchitis is undoubtedly the most frequent complication. Military, naval, and lay observers give statistics regarding testicular involvement which range from 0 to 63 per cent, with subsequent atrophy in different epidemics, varying from 0 to 100 per cent of the orchitis cases. It is pertinent to remark here that the atrophy usually involves only a portion of the diseased testicle [13, 14, 15]. Several cases are on record in which the first manifestation of mumps was the orchitis, with a subse-

[2] In 1918 there were 4,972 cases of mumps reported in Massachusetts out of a population of 3,920,988. Among these, 3,426 were males and 1,546 were females. The mobilization of soldiers and sailors in this state explains the much greater percentage in the male sex. In 1917 there were 7,125 cases, and in 1916 there were 2,318 cases reported. The incidence by sex is not obtainable for these two years. I am indebted to Dr. George H. Bigelow of the Massachusetts State Dept. of Health for these statistics.

Among 58,331 cases of parotitis reported in Denmark from 1870 to 1894, seven died, and two of these deaths were in infants less than a year old [5].

The youngest case of mumps on record is in an infant twenty-four hours after birth [6] and the oldest case is in a man of ninety-nine and a half [7].

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quent involvement of the salivary glands [16, 17, 18, 19], and during epidemics of this disease it is not an uncommon experience to see cases of orchitis of undoubted mumps origin where there is apparently no previous history or subsequent development of a parotitis [20]. A further complication of orchitis is its occurrence in an undescended testicle [21, 22]. The age of the patient bears little or no relation to the incidence of orchitis once the age of puberty is reached, it being approximately the same in epidemics reported among schoolboys, cadets, young and old soldiers. Weigert [23] found orchitis more frequent in the cavalry than in the infantry, an interesting observation which must be left for discussion to a subsequent paper.

Girls and women succumb to mumps more frequently than is commonly supposed[3], and coöphoritis is not an uncommon complication.[4] The infrequency with which nurses are affected in military hospitals in comparison with the Medical Corps men must be explained on other grounds than sex susceptibility.

In the foregoing introduction I have not attempted to do more than to arouse the interest of the reader in the subject, and to demonstrate that mumps deserves more consideration in the medico-military literature of this country. Since the first duty of a medical officer is the prevention of the spread of disease, I shall take up in this paper a consideration of the present status of our knowledge of mumps as regards its etiology, mode of transmission, incubation, and period of infectivity with reference to quarantine.

ETIOLOGY

The causative factor of mumps remains undetermined. But this does not mean that we are entirely ignorant of its nature. It is perfectly obvious that the disease is infectious and contagious; and, since it is primarily an infectious disease of the salivary glands, we may very properly assume that the contagium gains entrance through the mouth by direct or indirect contact and finds its way to the site of its most favorable nidus, the parotid gland. Many clinical observers have laid stress on the pharyngitis accompanying the early stage, and Petrilli [33]

[3] In the epidemic at the orphan asylum in Moscow in 1840 there were 82 cases among boys and 80 among girls [24]. In the Geneva epidemic of 1848-49 Rilliet and Lombard treated 38 males and 35 females [24]. In the deaf and dumb asylum at Breslau (1864) 18 boys and 16 girls were affected [25]. Fabre (1887) [26] reported that in three epidemics he found 30 cases in men and 28 in women. Roger (1899) [27] reported 33 cases in males and 19 in females. In an epidemic in Norway (1900) the cases occurred as follows: 159 boys, 114 girls, 47 women, and 34 men [28]. In a Hamburg epidemic Schottmüller (1904) [24], saw more cases among females than among males. In a mild epidemic in Bombay in 1914 there were 15 cases in girls and 10 in boys [29].

Epidemics of mumps have occurred in girls' schools, the most famous being that of Saint Cyr reported by Dionis [30] in 1708. Later epidemics in girls' institutions were reported in Bombay [31] and in Russia (1902) [24].

[4] A complete review of this subject with a full bibliography has been given by Josephson [32].

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goes so far as to assume that mumps is primarily a disease of the pharynx, from which it spreads to the salivary glands. In connection with this theory one might mention the cases of orchitis preceding the parotitis, a case reported by Chillingworth [34], where ovaritis preceded the parotitis, and the pancreatitis which sometimes accompanies the prodromal symptoms, as in the acute exanthemata and acute tonsillitis. Following the involvement of the salivary glands we may have more or less direct complications of the disease in the epididymis, testicle, prostate, ovary, mammary gland, pancreas, meninges, facial nerve, ear, eye, and heart.

Many efforts have been made in the last twenty-five years or more to isolate the organism, particularly in American, French, and Italian laboratories. Laveran and Catrin [35] (1893). Mecray and Walsh [36] (1896), Granata (1908), Herb [31] (1909), and others, have bent their energies in this direction. A diplococcus in pure and mixed culture has been isolated from Stenson's duct and from the parotid gland of acute cases, and has been made to produce parotitis when injected into Stenson's duct or the parotid gland of animals. The parotitis produced by such injections, however, was usually of the suppurative variety, and the organism experimented with by Herb was obtained from a suppurative parotitis. It is exceedingly doubtful from the evidence produced whether this diplococcus is the causative factor of mumps.

The recent work of Wollstein [38], however, demands full consideration, because the result of her researches has narrowed down the facts on this subject to something of tangible and practical importance; namely, that the disease is associated during the acute stage with a filterable virus in the saliva[5], which is sterile by the ordinary aerobic and anaerobic methods, but which, when inoculated into the parotids of young healthy cats brings about a definite parotitis not manifested in controls. The facts brought out by Wollstein offer a definite contribution to our knowledge of the etiology, and help to place our theories regarding the disease on more substantial bases than has been hitherto possible. Still it must be borne in mind that all attempts to isolate the causative element itself in any tangible form have succeeded only so far as to show that it can be transmitted with increasing virulence through successive inoculations; and its tangibility, even to this extent, rests solely on constant pathogenic manifestations in the cat. The following is a brief review of Wollstein's more important observations:

[5] Granata was the first to experiment with a sterile saliva filtrate in rabbits. Gordon used a similar filtrate for intracerebral inoculations into monkeys [38]. Radin [11] aspirated the parotid gland of mumps cases under aseptic conditions, obtaining a clear secretion which was sterile on all culture media, but he did not test it by animal inoculation. Nicolle and Conseil aspirated the parotid glands of mumps patients and inoculated the fluid obtained into the parotids of monkeys. After sixteen to twenty-six days fever developed and, in one case, the parotid became swollen [38].

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The virus contained in the filtrated salivary secretions of children and adults in the acute stage of mumps, when injected into the parotids of young cats, produces a pathological condition similar in several features to mumps in human beings. The parotitis develops in these animals five to eight days after inoculation, and persists about eight days, being accompanied by a rise in temperature, leucocytosis, an absolute increase in mononuclear cells, and tenderness and swelling of the parotid with definite histological changes similar to those recorded in human mumps; namely, "edema of the interlobular connective tissue with mononuclear interstitial infiltration about the ducts and elsewhere." The pathological conditions set up by the filtrate are intensified after the third or fourth transfer to other cats (with saliva or gland emulsions), and diminish with the sixth or seventh transfer, being effective only once at the eighth transfer. The testicles of cats when inoculated with the filtrate develop an orchitis on the sixth or seventh day which persists ten to fourteen days, the histological changes "consisting of degeneration of the epithelium and interference with spermatogenesis." "Atrophy of the inoculated testicle occurred in several cats after the acute symptoms had abated."

"The virus is most readily detected in the saliva during the first three days of the disease"; but after the acute stage has subsided in the patient, all inoculations of the filtrated saliva are negative.

The filtrate from a recurrent case of mumps gave positive results on inoculation into cats as long as the parotid of the patient remained swollen. Reinoculation with the filtrate as soon as the symptoms of the first inoculation had subsided gave practically negative results. Blood serum from a cat three months after recovery from parotitis, when left in contact two hours with an emulsion of the parotid gland of an inoculated cat at the height of the disease, inhibits the action of the virus as shown by controls made with emulsion alone. Defibrinated blood from cases of mumps when injected into the parotids of cats produced a parotitis, the degree of which was in proportion to the severity of the symptoms in the patient from whom the blood was obtained.

The observations were made at two different times, the salivary filtrate from cases of mumps being obtained from children and soldiers with constant results. The wide field covered by these experiments offers much room for the discussion of practical considerations. Even the confirmation of the theory that the contagium is contained in the saliva is an important contribution, however obvious and therefore superfluous this may appear to that type of physician who looks upon all research as a waste of time unless "grandstand" results are accomplished.

The fact that the blood serum contains the exciting element of the parotitis tends to explain the manner in which many of the complications are brought about. Since the parotitis produced by the blood serum is similar in time and appearance to that obtained by the salivary filtrate, we may hold the theory that it is the "virus" and not a soluble toxin which is at work in other parts of the body. Furthermore, Wollstein states that "the lymph nodes on the uninoculated side were observed to be swollen and moist, as though the infectious agent present in the saliva had been carried to them, presumably by the lymphatics. The lymph nodes showed necrosis of the center of several lymph nodules,

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while the sinuses were distended and the lining cells swollen." The swelling of the cervical lymph nodes was a marked condition in many of the soldiers who had mumps at the army camps near New York, from whom the saliva was used for these experiments. Swelling of the lymph nodes as a concomitant symptom of the disease has often been referred to by English and French authors.

From all this it would appear to be a reasonable supposition that the virus spreads from the parotid to the testicles via the body rather than by hand via the urethra, as is held by some. This is in keeping with the observations of Lewis [11], who found "that careful sterilization of the hands and protection of the glans penis did not reduce the incidence of the complication." Furthermore, other complications of mumps arising in various glands and organs of the body might thus be explained as being in the nature of metasteses from the original nidus of infection, since their characteristic is inflammation unassociated with pyogenic organisms[6]. Although we cannot rule out the possibility that a soluble toxin plays a part in these complications, we can imagine that an endotoxin of the causative organism itself is responsible[7].

If the circulation plays the important rôle in bringing about complications, rest is desirable during the acute stage. This does not necessarily mean rest in bed for mild cases, because, in Radin's series, patients who were allowed to go to meals and walk about the wards showed no greater incidence of orchitis than those who remained in bed throughout [11]. It is interesting to note the change of mind in Dukes [41] on this subject. In 1899 he states rather emphatically that if patients are kept in bed eight days, orchitis would not develop, but in 1900 he refers to this statement as incorrect, because, in a later series of thirty cases, he had 20 per cent orchitis, although "not one boy moved from his bed for any purpose whatever for eight days." However, this clinical evidence should not lead us to the other extreme of putting patients to duty about the wards or allowing them to indulge in violent recreation, as is sometimes permitted.

That the blood serum after recovery has an inhibitory action on the

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[6] The otitis media cannot be included among these complications, but the labyrinthitis and involvement of the auditory nerve could be. The meningismus which occurs may be attributed to the mumps virus, but severe and fatal forms of meningitis in the course of this disease may well be considered to be due to a secondary infection. For a recent discussion of the cerebral complications, see Casparis [30] and Haden [31].

[7] That the virus may pass through the placenta is evident from the following case reported by Homans [6], "who found in the child of a woman whose labor came on in the eighth month as the result of parotitis, a swelling of the left parotid gland, on the day after birth. The swelling increased upon the two next days and was distinctly painful." White [39] also reports that a nursing infant came down with mumps six days after birth, the mother coming down the following day. In this connection we may note that Merklen and Meléande cite cases where infants continued at the breasts of wet nurses ill with mumps without becoming infected [40].

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virus is in accord with the clinical observations of Hess [42], who reports that of twenty children inoculated with 6 c.c. to 8 c.c. of blood serum from convalescent mumps cases, none contracted the disease, although fully exposed to it. As this author points out, the long incubation period favors the administration of this serum as a prophylactic measure. I have been unable to find in the literature any reference to the use of this serum in the treatment of the disease itself. The results of Hess and Wollstein should encourage work regarding its efficacy in the prevention and control of complications.

MODE OF TRANSMISSION

The mode of transmission of mumps is by direct and indirect contact. Under direct contact we have to consider kissing as the most direct method. The child with mumps kisses its mother, other relatives, and friends of the household. At night the mother kisses the other children one after the other, and thus the child with the prodromal symptoms of an acute disease may be put to bed first, and the contagium is then implanted a short time afterwards on the lips of the other members of the family. Among soldiers Kulka and Neumann [43] report the spread of the disease by means of a pipe which a mumps case was smoking immediately before his admission to the infirmary. Two of his companions took a few puffs from the pipe just outside the surgeon's office and were infected, while others sleeping in the same quarters with the man the night before escaped. Three things are brought out by this incidence. In the first place, contacts should be selected with the care and diplomacy of a detective rather than by routine methods, particularly when the symptoms of the patient preclude droplet infection[8]; second, smoking tobacco does not always disinfect the mouth, as some of our colleagues in and out of the army would have us believe; third, the pipe passed about in this Indian fashion is a method of contact transmission almost as direct as kissing. A less direct method is the cigarette package. An individual who proffers his package to others, allowing the dirty fingers to soil the ends of several cigarettes in the attempt to extract one, offers a chance of disease transmission comparable to the common drinking cup.

[8] Where contact infection is to be dealt with in contradistinction to a combination of contact and droplet infection, it is advantageous to consider the character of the soldier who is the source. I recall a case of diphtheria in a sergeant, a man of refinement, a college graduate, and particularly careful about his personal hygiene even under difficulties. At the time he was quartered in a room with twenty of his subordinates of the 101st Ammunition Train in one of the old stone barracks at Camp Coetquidon, France. He had had a sore throat for thirty-six hours before he was transferred to the hospital. Owing to the stress of work the contacts were not isolated. Repeated throat examinations and cultures from twenty-four possible contacts failed to reveal another case, and no further case developed in this command during the next two months. The next case of diphtheria occurred in an echelon at the front in comparatively good quarters, this time in a private of low mentality and careless as to his personal hygiene. Five contacts of this case came down with the disease.

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Technically, the pipe in the above case may be considered as a fomes, but usually the conception of fomites infection carries the idea of a more indirect contact. Aldersmith and Schelly [44] express the opinion that fomites play a part in the spread of the disease and that this affords an explanation for certain reports as to the incubation period which seem incredible. Roth [45] reports one case where the doctor carried the disease from a mumps patient to another patient, the latter becoming infected with mumps while the doctor escaped. This is a typical example of the spread of the disease by hand, the physician having carried the contagium directly. We must bear in mind, however, that everything with which the hand of man comes in contact may be concerned in the spread of disesse. Just as the lips of the fond mother may be the most direct means of spreading the contagium, so the hands of the physician must be equally considered as a serious menace to his patients in the absence of an "aseptic conscience" a quality as important to the physician as to the surgeon.[9] The basin of water, the cake of soap, and the scrubbing brush should be more frequently used at sick call in the field. Soapy water is a disinfectant. Where water is scarce, the same water may be employed for several washings, as it tends to purify itself. At any rate, the mechanical removal of organisms by the scrubbing brush is unquestionably a safer procedure than dipping the hands into a blue or pink solution, or wiping them off with a towel moistened with the same.

The element of time is the important factor in infection by fomites. Since we cannot experiment with the causative organism, clinical observations must be our guide. Roth [45] reports the case of a woman of twenty who was admitted to the hospital with diphtheria and placed in a bed previously occupied by a mumps patient. Eighteen days after admission she came down with mumps, although all the bedding had been subjected to steam for two hours and to dry heat at 100° C. for another two hours. Roth incriminates the bedstead as the fomes. Certainly the experience of all contagious hospitals is in favor of the efficacy of heat sterilization with mumps as well as with other contagious diseases. But we must be consistent in disinfecting beds and wards. Everything with which hands or bedding come in contact must be washed, dried, and aired to accomplish this. The experiments conducted by Walcott [46] with reference to diphtheria should make us

[9] Joseph [25] (1864) noticed that in the epidemic at the deaf and dumb asylum in Breslau, many children who used the same drinking glasses and spoons with the mumps cases did not come down with the disease; and, furthermore, that even though he did not wash his hands after inserting the finger into the mouths of children with mumps before examining the mouths of well children with the same fingers he did not spread the disease. These observations are so at variance with clinical experience that we must consider them either as erroneous, or, as Schottmüller points out, as a corroboration of the natural immunity suggested by the morbidity statistics.

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wary of relying on formaldehyde gas disinfection. The physician would do well to follow the surgeon in attempting asepsis in preference to antisepsis.

There is one instance on record of mumps being transmitted from a boy to a dog [47], which brings up the possibility that domestic animals are concerned in the spread of the disease. The case is so unique that I merely mention it without further comment. I have found no records of epidemics traced to water or milk supply, but food has been considered by several as a possible source of infection. Moser and Arnstein [48] considered this as a possible source in an epidemic on the eastern front, although fomites infection could not be ruled out, since mumps had been epidemic in the community previous to the billeting of their command in the area. In regard to the spread of mumps by fomites, it would appear from a study of the various epidemics that the contagium is spread to a large extent by indirect contact involving fomites, in which the time limit in connection with the element of drying is as yet undetermined. Nevertheless, I feel justified by my experience and that of others in assuming that the time limit is probably shortened to hours rather than days in the presence of fresh air and sunshine. In other words, drying seems to hasten disinfection.

INCUBATION PERIOD

Our knowledge of the incubation period of mumps is still in such an unsettled state that we continue to have conflicting rulings by boards of health and military authorities concerning the isolation of contacts. Writers on mumps have quoted former writers on this subject with no apparent effort to ascertain the origin of the statements given. Thus we find the incubation period given as ranging from three to thirty-five days, "or longer," and the average varying with different authors from fourteen to twenty-five days. For this reason it has seemed worth while to collect all the observations from the available literature in the hope of ariving at a more tangible idea of the subject.

During epidemics considerable interest has been directed to the incubation period in France, England, and Germany, but throughout we find comparatively few careful observations. Owing to the fact that the disease is infectious before the salivary glands become appreciably swollen—in other words, in the prodromal stage—and to the fact that missed cases are not infrequent, the precise date of infection is often difficult to ascertain.[10] This accounts for many inaccurate statements

[10] The following two reports of probable incubation periods are given as examples of the source of many of the observations recorded:

Jobard [50] cites an epidemic of mumps on board the *Medusa*, where the first case occurred twenty-three days after the ship had put to sea. The original thesis of this author is not available, but it is as possible that this first case was infected before embarkation as it is that an "escaped" mild or con-

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TABLE I

Author	Reference	Date	Number of observations	Average	Minimum	Maximum
1. Wagner	49	1869	3	18	12	21
2. Jobard	50	1875	1	23	.....	.....
3. Laveran	50	1875	1	15	15	15
4. Jacob	51	1875	3	19	.....	.....
5. Soltmann	52	1878	4	12.4	9	18
6. Manby	53	1878	3	24	21	29
7. Luehe	54	1879	122	17.5	.....	.....
8. Fournié	55	1881	10	20.3	16	26
9. Dukes	41a	1881	57	18.5	14	24
10. Bettelheim	56	1883	2	23	22	24
11. Rilliet & Lombard	63	1886	29	19	8	26
12. Roth	45	1886	3	18	18	18
13. Müller	57	1886	3	14	14	14
14. Clin. Soc. of London	58	1892	133	18.5	14	25
15. Rendu	59	1893	2	18	17	19
16. Sevestre	60	1893	1	22	22	22
17. Catrin	61	1893	159	17.5	.....	.....
18. Antony	62	1893	42	19.5	8	30
19. Comby	3	1893	1	19	19	19
20. Bobrie	63	1893	1	24	24	24
21. Merklen	64	1893	3	15.7	15	17
22. Holt	65	1897	3	19.5	19	20
23. Dukes	41b	1899	33	18.5	15	22
24. Schottmüller	50	1904	1	20	20	20
25. Bloomfield	66	1905	2	23.5	22	25
26. Dukes	41c	1906	23	17.6	16	23
27. Falkenheim	5	1908	1	14	.....	.....
28. Feiling	67	1915	4	20	.....	.....
29. Radin	11	1918	2	16.5	14	23
30. Wesselhoeft	.....	1919	6	18.8	17	20
Totals	.....	.....	658	18.15	8	30

by observers, and it is surprising to note how few made personal observations on more than ten cases, from which their deductions were drawn. However, it is a very significant fact that all those who observed the greatest number of cases arrived at an average incubation period ranging from 17.5 days to 19.5 days. In Table I are included the available data to date, together with six of my own observations. If we take the average of each author as given, multiply it by the number of observations he made, and then divide the sum of these results by the total number of observations recorded, we get a total average of 18.155 days.

valescent case was on board when the ship sailed. This would be clearer if we knew the date on which the next case occurred.

Falkenheim [5] describes the case of a boy who contracted mumps in the following manner: "The mother declares, upon being asked, that similar cases had not occurred in the child's brothers or sisters, but a playmate of the patient was affected in a similar manner fourteen days previously." We may ask whether the playmate first showed the parotid swelling fourteen days ago, and whether the patient played with him on the two days previous to the appearance of this swelling. In other words, the true date of exposure is not clear.

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TABLE II

Author	Date	Number of observations	Average
1. Luehe	1879	122	17.5
2. Dukes	1881–99	90	18.5
3. Rilliet & Lombard	1886	29	19
4. Clinical Society of London	1892	133	18.5
5. Catrin	1893	159	17.5
6. Antony	1893	42	19.5
7. Dukes	1906	23	17.6
Total	.....	598	18.09

TABLE III

Author	Reference	Date	Number of observations	Average	Minimum	Maximum
1. Leitzen	45	1838	.....	18	.....	.....
2. Lebert	68	1859	.....	.....	8	21
3. Gerhardt	69	1874	.....	14	8	21
4. Henoch	70	1892	.....	14	.....	.....
5. Comby	47	1897	.....	.....	18	26
6. Penny	71	1904	12	.....	18	25
7. Aldersmith	44	1905	.....	.....	19	21
8. Douglas	72	1905	3	.....	28	35
9. Hudelo	73	1905	.....	18	8	30
10. Edgecomb	74	1908	33	.....	.....	25
11. Krause	75	1911	.....	17.5	.....	.....
12. Weigert	23	1916	79	.....	18	30

When the averages of the six largest observations are taken, and the result computed in the same manner, we get 18.09 days, as shown in Table II. In either case, there is an error by reduplication, as the first fifty-seven cases of Dukes are included among those recorded by the Clinical Society of London. Table III consists of statements of experienced authors and miscellaneous observations which cannot be grouped in Table I. Although many of the figures as given in these tables are based on testimony which cannot stand the test of careful scrutiny, I have refrained from including records and assertions accompanied by testimony so meager as to carry no weight whatsoever. More complicated tables are hardly warranted when we consider the inaccuracies of many of the observations given. Consequently, the results are given for what they are worth, and, since the averages arrived at are so constant, they are certainly of significance.

One of the most interesting contributions to this subject is that of

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Captain Orr [10], of the Canadian Army Medical Corps. This author has obtained his conclusion by a different methods from the others, but his result is practically the same. In an epidemic of 902 cases occurring at Surrey between December 30, 1916, and May, 1917, he tabulates the number of cases diagnosed daily during this period, charts the results, and analyzes the figures obtained by the periodogram method. Although there is a suggestion of a possible twelve- to thirteen-day incubation, which he himself considers of doubtful significance, there is a very definite oscillation of the chart every eighteen days through six successive waves. The mathematical demonstration of this eighteen-day cycle is very striking. Orr remarks that this seems to represent a phase in the left cycle of the causative organism which is maintained through several "generations." The use of the term "generations" is hardly applicable, as the generative cycle of the different malarial plasmodia and the rapidity of fission of the diphtheria and typhoid bacilli bear no definite relationship to the incubation period of the diseases caused by them. What is brought out by Orr's work, however, is a definite eighteen-day cycle of periodic infectivity during an epidemic of mumps, which conforms to the average incubation period as arrived at through the study of individual cases by others, and consequently corroborates the conclusion that this should be given as approximately eighteen days.

The practical bearing of this conclusion has to do with the management of contracts. Where sporadic cases of mumps occur in a command under peace-time conditions, it is advisable to isolate contacts—with due thought as to the possibility of actual contact infection—from the fourteenth to the twenty-fourth day after exposure. Providing that no cases occur among the contacts, they could then be returned to duty with their command. On the other hand, if cases develop among these contacts, those who escaped the first exposure cannot be considered as immune to the second exposure in the isolation camp. This error was frequently made by camp surgeons in the late war. The inconsistency of releasing contacts at the very time when an infectious disease was to appear in an individual (namely, just at the end of the average incubation period) and of releasing contacts after a second exposure, without giving warning to the medical officer of the command concerning this second exposure, resulted too often in the further spread of the disease at much the same rate as would have taken place without the costly misdirected energy of inconsistent isolation. The question of keeping the secondary exposures isolated for another similar period depends on the number of contacts, the number of cases developed in the command, and the economic results of such a procedure. Once mumps has become epidemic, the isolation of contacts is a difficult problem, but the principles involved

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demand careful consideration.[11] During any large mobilization of recruits or in the zone of operations, the isolation of contacts in the face of an epidemic of this disease is hardly justifiable. Strict vigilance on the part of medical officers serving with troops for the early diagnosis of mumps is of great importance, and the knowledge of the fact that this disease is infectious in its prodromal stage, as well as a clearer conception of the incubation period, would help these surgeons to fulfil their duties in this respect in a more efficacious manner.

PERIOD OF INFECTIVITY

We now come to the subject of quarantine of patients. The period of infectivity of mumps is no more unsettled than it is with most infectious diseases where the causative organism has not as yet been isolated. Here again the main testimony must rest on clinical data, but we shall begin with the results of Wollstein's experiments, which afford the only laboratory evidence. This author concludes "that the period of infectivity of the mouth secretions, as far as this test is capable of indicating, is comparatively short and covers about one week, corresponding to the swelling of the parotid. A fresh swelling appearing in the opposite parotid gland would, of course, prolong the infectious period for a given patient" [38c].

We have abundant clinical evidence that mumps is contagious in the prodromal stage. This fact is emphasized in the report of the committee of the Clinical Society of London [58] (1892): "Mumps is very infectious at the time of onset of the parotitis, and during the prodromal stage, which, in order to be on the safe side, should be assumed to be four days. The chance of infection diminishes progressively from the onset of the parotitis, and has ceased three weeks after that date, and probably earlier." A discussion of this point at a meeting of La Societe Medicale des Hopitaux de Paris brought out valuable data.

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[11] The suggestion made by Lieut. Col. J. C. Gittings in THE MILITARY SURGEON (June, 1919, p. 642); to the effect that a previous history of infectious diseases be recorded on the soldier's service record might be of advantage. The accuracy of the average recruit's statements on this subject is sufficiently questionable to offer room for discussion. In the field and at an army post it is safer for the surgeon to examine each contact and question him at the time as to his past history. Nevertheless I do recommend that infectious diseases occurring during the enlistment period, regardless of the relative immunity conferred by one attack of the disease, be recorded on the service record.

The relative immunity conferred on an individual from one attack of mumps cannot be considered in this thesis. Suffice it to say that one attack usually does confer immunity for life, although many exceptions to this rule are on record. I could quote three cases from my own experience. The most interesting case of recurrent mumps is depicted by Leber [76]. A soldier in the French army was admitted to the hospital with mumps six times between November, 1912, and March, 1915. Each time mumps was epidemic in the units in which he served, and on each occasion the diagnosis was confirmed by the characteristic course pursued. Catrin [61] reports that out of 157 cases of mumps nine had had attacks one or more years previously. Fournié [55] states that five of his twenty-four cases had had mumps before. Manine [77], reporting on 122 cases on board two ships of the French navy, states that twenty-seven had had mumps previously.

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Rendu [59] reported two cases infected by patients the day before the appearance of symptoms. Sevestre [60] and Antony each reported similar cases, and Comby [60] told of a girl who went to a dance the day before she came down with mumps and infected seven of her partners. Most authors mention the prodromal stage of mumps as being within the infectious period, even though they do not cite instances from their own observations. One of my own cases, a girl at college, unquestionably contracted the disease from another student who showed the first symptoms the day after the only possible contact between the two. In taking precautions to isolate all contacts, the prodromal stage of the patient should be considered to extend forty-eight hours previous to the appearance of the parotitis.

As to the duration of infectivity, although this is arbitrarily set by different authors at periods varying from four to five days (Rendu [59]) to twenty-five and thirty days (Comby, [47], Weigert [23]), the general trend of the experienced authors is to be guided by the duration of the symptoms. From the economic standpoint I believe that this course is advisable during epidemic conditions, both in the Army and in civil life.

Such a period could warrant a release under ten days. The retention of a mild case of unilateral mumps after the initial subsidence of the gland, with the idea of watching for further glandular involvement or sequelae, is not justified in the Army during an epidemic, since the late incidence of further glandular involvement and complications does not warrant the continued hospitalization of the otherwise healthy individual capable of performing full duty. The cost of such hospitalization to a division in the zone of operations is probably out of proportion to the loss of man-power in the field resulting from the return of cases released early, either by recurrence in other glands, complications, or so-called "return cases." The early return of such mumps cases would call for more vigilance on the part of battalion surgeons, the sort of work in which medical officers can show professional ability more akin to our general ideas of the science and art of medicine than those arduous and far-reaching responsibilities in sanitation and hygiene. Furthermore, such a procedure necessitates that the medical officer of the hospital shall examine all cases for discharge, retaining for temporary duty in the hospital cases where there is persistent swelling of a salivary gland, and discharging those in whom the swelling has subsided, regardless of their stay in the hosptal. In this connection it is important that he examine all the salivary glands.

Of course every effort should be made to separate a unit which is free of the disease from a unit which has been contaminated. In the

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zone of operations this is not always feasible, and the civil humanitarian must bear in mind that in time of war the aim of all branches of the service, including the Medical Corps, is the defeat of the enemy in the shortest possible time with the least expenditure of life and money. With this in mind it is conceivable that circumstances can exist where the strategical situation prohibits the realization of our ideals regarding isolation pertaining to a disease such as mumps. Nevertheless, when conditions do warrant an attempt to realize our ideals in this respect, immense saving can be accomplished. Particularly should this be carried out in barracks, and on transports, cruisers, and dreadnaughts, where isolation facilities are available. An example of the results of strict separation of units is depicted by Laveran [50]. In 1874-75 mumps became epidemic on the Island of Oléron, where there was a garrison in the castle. In January mumps broke out among the 250 soldiers quartered in the right wing of the castle. The left wing contained 220 marine cadets. These latter continued a more drastic training in the bad weather than the soldiers, but with the strictest isolation from these soldiers and the civilians this younger unit entirely escaped. When we consider that this was accomplished almost fifty years ago, we should be encouraged to make greater efforts along this line.

With sporadic cases a twenty-one-day quarantine period dating from the onset of the symptoms would be the safest and perhaps the most economical. When we set any definite time limit we are confronted with the problem of parotid hypertrophy following mumps. Very little is said about this in the literature. Merklen [64] reports a case in which the parotid remained swollen four weeks. Albert [78] writes of two buglers in his regiment who were the only cases to show relapses out of forty-five cases of mumps in the command during 1893 and 1894. Each of the two had three relapses. In one the parotid remained swollen after the second relapse and the swelling persisted for ten months, while in the other it remained swollen for eight months after the third attack. The fact that these two musicians were the only ones out of forty-five cases to show relapses, together with the fact that in each case the relapse followed closely upon the resumption of the use of the instrument, is of significance, particularly since the author clearly differentiates these cases from gas blowers' tumefactions of the parotid. Antony [79] speaks of one case of unilateral tumefaction persisting for one year after the attack of mumps, and of another case where it persisted for "several months."

I recall two soldiers of infantry in the A. E. F. who were kept in the hospital three weeks, and returned with unilateral parotid enlargement without tenderness. For two months following their release no new cases

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of mumps developed in their respective companies. One of these men was wounded in action six weeks after his return. The other was gassed, and at the hospital was diagnosed as mumps during his convalescence, and quarantined, much to his disgust. He returned to the command with a perceptible swelling of the parotid, which I remember to have noticed almost six months after the acute stage. Although I did not have the opportunity of following these two cases through the acute stage, I am inclined to the belief that persistent enlargement of the parotid after the subsidence of the actue symptoms is the result of secondary infection of the gland with a walling-off process. This view is borne out by the fact that the pathology of tissues affected by the mumps virus in other parts of the body is characterized by a tendency to atrophic degeneration, rather than hypertrophy, after the acute stage.

The tenderness of the glands in these cases might be taken as an indication that the patients should be kept under quarantine, on the assumption that the secondary infection is keeping alive the infectivity of the disease, as in the suppurations of scarlet fever; but if my theory of a walling-off process is correct, such a conception of a prolonged infectivity is not without its flaws. However, ignorance should tend to make us cautious. A memorandum from the hospital to the surgeon of the unit on the return of such a case would stimulate observations as to any "return cases."

During December, 1918, and January, 1919, when the quarantine of mumps in the A. E. F. was according to the duration of the symptoms— the men usually returning after eight to twelve days— the incidence of mumps in the 102d Infantry did not apparently increase, in spite of crowded billets, the influx of replacements, and vigorous training in rain and snow. Furthermore, contacts were not isolated at this time. However, it is well to remark at this point that during the first year of the Civil War there were forty cases per thousand men, and that in the second and third years the number fell to twenty-three per thousand, and in the fourth year to fourteen per thousand. This epidemiological factor should be taken into account when we consider that in December, 1918, we were well along in our second year of the war.

When the full data on mumps during this last war is available from the Surgeon General's Office we may be able to gather some useful information in connection with the period of infectivity. If it bears out the policy adopted in the later days of the A. E. F.—namely, the minimum quarantine period according to the duration of symptoms—we shall have made distinct progress in our knowledge of mumps, which, if applied, will result in immense economic saving both in military and in civil life.

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THE PARAFFIN-WAX TREATMENT OF BURNS, WITH SPECIAL REFERENCE TO MUSTARD-GAS BURNS

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THIS article is an attempt to present to its readers a survey of burns in general, and also a résumé of my work, reading, and observations on mustard-gas burns in particular, as seen in the American Expeditionary Forces. The work was done in Base Hospital No. 64 at Rimaucourt Hospital Centre, Haute Marne, France.

The use of ambrine in the care of mustard-gas burns is original as far as I can find in my efforts at reading all available literature, papers, pamphlets and bulletins, and my results were so thoroughly satisfactory and pleasing, that I trust this article may prove as interesting to the Surgeon General of the U. S. Army, as well as to all officers of the Medical Corps, and likewise to those of us who have recently served and returned to our civilian professional duties.

The medical profession as a whole agree as to the classification of burns into three groups, differing, however, from the six-type classification of Dupuytren, and in this survey the question will be considered as dealing with the three-type classification. In addition to this general discussion of burns, let us also spend a little time on that type of burns which we saw in the war zone and which incapacitated for a variable length of time the men needed in the lines, whom it was our duty as medical officers to return to their units as fit for duty in the quickest time possible and with the best possible results. But while we are generally agreed as to the classification of burns, there is general confusion and much misunderstanding concerning the treatment of them. None of the many methods have been totally satisfying either to the patient or to the physician. Let us start out with this conviction, viz., that the method of choice is that particular method or technique which accomplishes the following for the patient: First, relieves pain; second, permits rapid healing and returns the patient to his work, or, as in our case, the soldier to his duty, at the earliest possible moment; third, the lessening of contracting cicactrices and along with this the prevention or limiting of deformities. Then to bring the attending surgeon into choosing a method which is the best for him we must consider, first, time as regards ultimate recovery; second, the ease of application; third, a pleased, comfortable, gracious patient during the treatment; fourth, gratifying results.

A superficial review of burns in general presents for study these facts:

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Symptoms.—Of a severe burn we have local symptoms presenting themselves with pain, and inflammation varying in intensity or degree, depending on their extent. Constitutional symptoms are present likewise. In all burned cases of any severity, our first thought must be shock. We can all recall cases admitted to our various hospitals and dispensaries showing a weak, thready, running pulse, shallow respiration and the whole picture of shock, putting us face to face with the immediate care of this condition. The patient may die without showing any reaction, but usually, unless the burn is extensively severe, there is a reaction followed by a severe reactionary fever, with, however, a tendency to congestion of the internal organs, which fact is never to be lost sight of. There follows, in many cases, vomiting, diarrhea, hemoglobinuria, albuminuria, and often enlargement of the lymphoid tissues throughout the body.

DeCosta has found extensive blood changes which might be enumerated as follows: (1) Polycythemia, which is due both from venous stasis and loss of blood plasma; (2) leucocytosis; (3) increase of blood plaques; (4) a tendency to clot. This clotting tendency may be the cause of damage to various organs and structures, and this along with the generally altered blood, some damages to the excretory organs are very prone and usually are seen in a mild or severe degree in every case. Along with these changes in the blood we must always keep in mind the loss of power of throwing off of the body excretory products in proprotion to the extent of the area burned, the formation of toxins at the burned site, and their absorption into the system already reduced in its excretory powers. Thus we have a gradual accumulation of waste products, augmented by toxins from the burned area, in a system with decreased eliminative facilities, and in a system going through the thralls of shock. In addition, another factor makes itself felt, viz., the disintegration of the red blood cells brought about by the reactionary high temperature, and "these products of corpuscular degeneration" may cause irritation or thrombosis of the kidneys or other viscera. This all makes us quite a complex problem and not one of a burn *per se*. In all burns of the head, one must be on the lookout for inflammation of the brain; in chest burns, for lung inflammation; and in abdominal burns we must be scrutinizingly careful of abdominal inflammation. The usual burn complications are considered to be some damage to the lungs, kidneys or stomach. The danger of burns depends on their extent, degree and situation. The prognosis for a patient with a burn of a large area superficially is much worse than with a small, deep area. I shall not attempt to go into a discussion of the so-called Curling's ulcer, which is said to be located in the first part of the duodenum, other than to give its supposed causes, of possibly the

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presence of toxic material (from the burn) in the bile, or from septic emboli; or as Moynihan claims it to be an ulcer toxic in origin only consequential to septic changes: the exact nature of these ulcers *in vivo* is not known, for I think none have ever been operated on.

Are burns infected? Clinically and bacteriologically all burns are sterile during the first few hours following the receipt of the burn, but thereafter they are all bacteriologically infected and all the more so after the skin begins to slough and become necrotic; and smears taken from the burned areas show saprophytes and cocci, so let us consider all burns twelve hours after receipt as infected wounds.

This hasty review of burns as a general question brings us up to a consideration of "Mustard Gas Burns," so-termed. These are the results of kultured warfare and are caused by a chemical, acting as a vesicant with the scientific name of dichlorethyl sulphide, but passing censorship as mustard gas, or yellow cross substance, deriving its name from its mustard or garlic-like odor. It exerts its irritant action as a vapor in low concentration in the air or by direct contact from splashes of the liquid; it is an oily liquid and is used in shells and scattered from them on the ground, where it slowly evaporates. This not only exposes those in the immediate vicinity of the shell-burst, but may also affect those who go over the contaminated ground later. The fluid may be scattered on clothing, shell-casings, rifles, etc., and may thus become effective through direct contamination of the skin. No irritant effect is felt at first, whatever the concentration may be, but after a delay of two to six hours, or even up to two to three days, the skin begins to react with a progressive inflammation that may progress to blistering and to local necrosis.

Skin Areas Involved.—The face alone seems to be in a class by itself in escaping its vesicant or escharotic action. The areas most severely involved are the axilla, penis, scrotum, perineum, inner surface of the thighs, the flexor surface of the joints, and the buttocks. Where the skin is sodden with fatty perspiration, as the axillae, perineum and flexor surfaces, the burns are the most frequent and severe, for there is a resolution of the gas brought about by the action of the moisture. The vapor or liquid clings to the clothing, and thus it continues to exert its irritant action. The burns ranged in degree from first, second and third, some cases showing simply first-degree burns with red erythematous patches on the body, some blisters, and others presented deeply burned areas. A combination of all degrees was common, but not necessarily constant. Edema of the burned areas is rarely seen, excluding the extreme edema of the penis and scrotum, and also some of the eyelids. In the areas showing simply the erythematous, sunburned

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reaction of the skin, there may be excoriation of the skin, or the skin may be retained while the erythema gradually fades, being replaced by a brown staining or bronzing. The early burns appeared as a rule in twelve hours, and they were usually severe, presenting the appearance of large, erythematous patches covered with large bullae, which contained a serous, sero-purulent or purulent material. The contents of these bullae are impregnated with the irritant chemical and, if the blisters are opened, allowing the contents to come in contact with one's skin, you in turn will suffer from itching and burning of the involved bathed areas; therefore in opening the bullae it was the routine to make use of a hypodermic needle in withdrawing their contents.

The erythematous areas cause a burning or itching similar to sunburn. The inflammatory reaction is chiefly superficial, and the dusky red color deepens and desquamates. The inflamed skin becomes very fragile, and the surface layer is readily loosened by pressure or careless rubbing. The blisters formed are almost painless in their development, but the raw surface that is left after the bullae are broken becomes most acutely sensitive because of the exposed nerve buds. Deeper destruction of the dermis may be caused by the spreading of necrosis, where the substance attacks the skin in high concentration, or when secondary infections are implanted on the raw surface. The purplish-brown, brown or brownish-black tint usually appears in areas that were first inflamed and red, but it may arise without any preceding erythema. This appears from five to six days and upwards, and persists for several weeks, ending by desquamation of the stained cuticle; this staining is not a deep or permanent pigmentation.

The lesions are chemical burns, unlike those produced by heat, electricity or the ordinary corrosives as sulphuric acid, nitric or hydrochloric acid or the strong alkalies: they resemble the hydrochloric acid burns nearest of all these agents. They differ from heat burns in the absence of thrombosis, in the greater moistness of the affected area, and in the fact that the necrosis requires some time for recovery. The coagulated, shrunken, cooked appearance of tissues in heat burns is not apparent in the tissues of mustard-gas burns. The blood-vessels are damaged and are collapsed, causing a local anemia. There is a peculiar deep penetration of even a minute quantity of the "gas," and no doubt its entrance is by way of the hair follicles, sebaceous and sweat glands. The lesions remind one of a roentgen ray burn of the skin, in that healing is slow, owing possibly to the blood-vessel injury. The retention of the irritant in the hair follicles and the sebaceous glands is evident by the many cases showing "return of burn" after baths taken even up to one month after the burned area has completely healed over,

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this probably being due to water decomposing (a characteristic property) what remnants of the chemical are still deep in the tissues.

Treatment of Burns in General.—We are all cognizant of the many various methods of treatment put forth by competent thinkers and conscientious workers, and each of us has seen results from the various methods, but do they all come up to the mark and do they all reach the goal we are striving for, and do they answer the questions outlined at the beginning of this paper? We have seen used the sodium bicarbonate wash, the normal salt solution treatment, the wash of peroxide of hydrogen, the various bland powders separately and admixtures of several; the application of picric acid as a paste and as a solution; the use of carron oil and many pastes of various composition. The treatment of burns had another star in its crown when the dry air method came into vogue, also the application of nature's sun rays and of manufactured light and heat. All these methods have been tried through many years, and each one is found wanting when we come face to face with the dictum we laid down for ourselves and to which I trust we all agree.

As I tried to bring to your attention again when considering the symptoms, our first duty in a burn of any severity is the treatment of shock, by morphine, stimulants and heat. We must prevent any additional shock in handling a burned patient, and so, if there is any extensive body burn, the uninvolved body surface is not to the exposed while we are dressing the case. If there is more than one burn on the same individual, only expose and dress a single burn at a time. In burns of fingers and toes we must continually be on our guard against "webbing," and so we must prevent apposition of parts by the interlaying of dressing material. In the aged we must be on the lookout for hypostatic pulmonary congestion. Contractures, that bugbear of burns, always stares us in the face and cry out to us, "Beware and prevent!" Here I might state, as regards shock in mustard gas burns, it was my experience that it was a negligible factor; the patients I treated had been "gassed" in the Argonne and, in addition to their body burns, the vast majority had also some inhalation effects, many showing intestinal manifestations. They were all fatigued, body-weary, fighting men.

Seventeen years ago Barthe de Sandfordt, in China, first made use of a paraffin-wax in the treatment of burns. The medical profession of very recent years has seen evolved a series of waxes and paraffins for the treatment of burns. The paraffin-wax treatment is the most recent step in the treatment of burns, and some men adhere to one formula while others stick to another. Some preparations have been made by dissolving in a paraffin base such antiseptics as acriflavine, brilliant-green,

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dichloramine-T, oil of eucalyptus, etc. It is difficult to incorporate these antiseptics in a paraffin base, and for this reason the mixtures are not entirely satisfactory. As regards these preparations, I have had no personal experience and so cannot truly discuss their pros and cons, only knowing that the preparations are difficult to make. The so-called new antiseptics of the war have also been used in the treatment of burns primarily alone, then using a wax, and some men claim very satisfactory results. A formula of great use throughout the British Isles is a formula of Colonel Hull, known as No. 7, paraffin formula of Colonel Hull and composed of the following: resublimed Bnaphthal, 0.25 per cent; eucalyptus oil, 2 per cent; olive oil, 5 per cent; vaseline 25 per cent; paraffin durum, 67.75 per cent. The olive oil in this preparation may become rancid. After many preparations were made by de Sandfordt, he finally perfected and put on the market a preparation of paraffin wax going by the trade name of Ambrine: its formula is a secret. The physical properties of this paraffin wax preparation are the following: neutral, non-irritating, a low melting point, is adhesive, non-brittal, and is elastic: it is solid when cold and at a temperature of 140 to 150°F. it is as thin as water; heating for eight to ten minutes at 250 to 260°F. renders it aseptic. Each of these properties is essential in the proper make-up of a wax to be used and to carry out the principles outlined for its application.

Many men claim that it is entirely wrong and against good surgical judgment to seal up burns, infected as they all are. But let us call to mind a severe case being dressed with powder or solutions, with the use of gauze; think of the painful and cruel removal of the gauze after it has become enmeshed in the burned area and the granulations. Aside from this picture, what happens to the fine scattered islands of epithelium striving for an existence and a foothold, and doing nicely until we with our methods of treatment come along and tear them asunder, cause a bleeding, granulating surface, and thus delay healing that much longer.

By the paraffin-wax treatment, in my series using ambrine, the patients are dressed without pain; they are easily and quickly dressed, both in applying and removing the dressing, and are comfortable during and after the dressing. The ambrine contains no specific medicinal ingredients but acts mechanically. The wax-cotton dressing is a non-adhesive shell, prevents the entrance of air to irritate the raw surface with its exposed nerve ends, maintains a constant temperature and acts as a splint to the proliferating tissues of the burned area. The dressing acts as a "poulticing splint" to the underlying traumatized tissues. Shortly after appliction, normal wound secretions form under the dressing, thus lifting it from off the wound or burned area and forming a shell, and to this fact is attributed the ease of redressing, not causing any bleeding nor harming the new regenerated epithelium.

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As told us by Dr. Sherman, burned areas treated by paraffin-wax method, heal two to three times more quickly and are free from cicatricial contraction with a minimum of scar tissue. As the same worker and writer has said, third-degree burns heal with some scar tissue, but it is infinitely less than with any other method and the scar does not have the tendency to contract, thus preventing the disfigurements and loss of function of parts incident to cicatricial contraction. The healed scarred area is found to be supple, and not tough, dense and thick, as is so frequently observed following other methods.

Two hundred and fifty-eight mustard-gas burned cases were under observation in my series, and they ranged from first to third degree with areas varying in size from that of a lima bean to the whole buttocks and extensive ones on the hands and thighs and body: they were all admitted to my care infected. Their previous dressings had consisted of the alkaline baths, lotions, dusting powders and many simply of vaseline. The cases hardest to handle were those presenting burns and excoriations of the penis and scrotum and inner surface of the upper thighs. At the outset it was my practice to dress all burned areas as follows: a sodium chloride sodium bicarbonate solution (sod. chlor., 70 gms.; sod. bicarb., 150 gms.; Aqua Dist. q. s., 5,000 c.c.) was used under thorough asepsis, thoroughly cleansing the burn and surrounding area, completely drying and then applying a dusting powder of the following formula—zinc oxide, carbonate of magnesium, carbonate of lime, of each 200 gms., talc 400 gms. After the application of this powder, sterile gauze and bandage were applied. This was the treatment outlined in an overseas medical corps bulletin, and it was given a thorough tryout but was unsatisfactory. The patients appeared comfortable and claimed that the dressing was easy. But the results were not gratifying, the procedure of removal of dressings was anything but pleasant for the patient and clearly showed the error in technique when at each dressing a sanguineous wound presented itself, even with the utmost care at time of dressing. The whole healing process was sluggish and unproductive of rapid, satisfactory results. After a trial of this method I resorted to the use of ambrine and continued it in all the remaining cases. The technique of the dressing of the penis and scrotum was somewhat different and markedly more painful, for here we were dealing with extremely sensitive areas, edematous, weeping, and the vast majority showing extensive excoriation, and in one case there was complete ulceration through the scrotum. One can well imagine the torture these men went through when lying as quietly as possible in bed, and the added torment each dressing caused them. The progress in these cases was not as satisfactory as one could wish for, and healing was very sluggish. Here I used

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mostly the alkaline treatment, with thorough cleansing of the entire area each morning along with suspension of the penis and scrotum by large cotton-gauze perineal pads. All these burns were extensively infected and gave off a very offensive and nauseating odor. It has been my privilege to see several healed mustard-gas burns of the penis, months after recovery, and the skin presented a thick, leathery, puckered appearance and consistency and a constriction effect, in one case necessitating circumcision.

A very interesting laboratory treatment and report of "the treatment of dichlorethylsulphide (mustard gas) injuries," emanated from the University of Michigan Pathological Laboratory and presented by Warthin, Weller, Roos, and Hermann appeared in the *Journal of Laboratory and Clinical Medicine*, dated October, 1918. I regret that the method employed by them in their scrotal and perineal burns, viz.: the sitz bath with Dakin's solution, had not been tried by me in the treatment of similar cases, all infected, and which were so sluggish in my hands, for I can see where that method may have been of some value and comfort to the patient, but their series and mine differ entirely: mine being exhausted soldiers evacuated from the Argonne, gassed throughout, meaning by this, most of them blinded (temporarily in the majority), showing the deleterious effects of gas inhalation, depressed and suffering from burns of various other parts of their body in addition to the scrotal and penis burns, and all bedfast, sick patients. A man who has been gassed is down and out, temporarily at least, physically and mentally, and all his alertness and fight are removed and you have a problem quite different to handle than a laboratory subject. But I disagree with them in the use of "air-excluding and infection-including protections," for my results from the use of ambrine were thoroughly satisfactory in every detail and a comfort to the patient, all proclaiming it the best and the most comfortable treatment they had had from the time of reception of burns, and there was noted the complete absence of that dread of dressing in all my cases.

The technique I followed in treating my series of cases was not time-consuming nor painful in the slightest degree, and is simple and economical. I was greatly handicapped at the outset by lack of proper paraphernalia and resorted to as fine and soft a shaving brush as the usual French shops offered, but even with this the dressing was thorough, easy and painless. I finally instituted the use of a simple De Vilbiss atomizer in spraying the ambrine on the burned area and can truly say it proved very satisfactory, but not convenient, for one had to be near a hot stove to keep the neck and nozzle warm in order to prevent congealing of the ambrine after it left the container en route through the

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nozzle, and if this did clog, the instrument from elbow to end of nozzle had to be heated to render it useful again. On this account it can hardly be of much use routinely. The most satisfactory instrument for applying the ambrine is the atomizer devised and perfected by Dr. Sherman of Pittsburgh. It is simple, efficacious, and retains its heat, in its double-boiler effect, for a suitable time, preventing the paraffin-wax from stiffening and also preventing the splashing of water into the paraffin-wax during its preparation.

My technique is an application of the Carrel technique, and I think here we have found a wide application for its use. Here again I was handicapped with no available neutral soap for cleansing the wound, but I used an emulsion of ivory soap. This is as bland and as neutral a soap as obtainable, and it proved as satisfactory as possible, knowing there was nothing better available.

Caution may be made here of allowing no water to splash or splatter into the paraffin-wax during its melting, for this will make the dressing painful. The paraffin-wax may be applied to any burned area at a temperature of 150° without fear of pain or burning.

On removal of the dressing one finds the paraffin-wax-cotton shell raised from the area and the whole area bathed with lymph and a purulent secretion, and in the early stages there are sloughing masses. There is often an offensive and nauseating odor, but this is no contraindication to the treatment. If there is an extensive, deep sloughing burn and the clinical picture is that of absorption of toxins, with local manifestations of infection as edema, redness, lymphangitis, the paraffin-wax treatment ought to be changed to the instillation of sodium hypochlorite solution until the toxemia and absorption have subsided; then institute the wax treatment again.

At the first dressing, say within twelve hours after receipt of burn, it is not necessary to scrub or wash the area with soap or antiseptics, for the tissues are sterile as a result of the burning and so we need not traumatize the tissues any further. None of my gassed cases were evacuated to our center before two or three days after receipt of their gasburns.

Unless there has been very extensive destruction of tissue, skin graft is unnecessary after the use of paraffin-wax. If necessary, I have found the Riverdin method the most satisfactory, after complete sterilization of the burned area, by the Carrel technique. By this method, anesthesia need be only local in obtaining the grafts, and thus we save any additional strain to kidneys just recovering from a severe toxic taxation.

Don't put cotton or gauze direct on any burn.

Don't discontinue paraffin-wax treatment on account of odor.

I have had the opportunity to treat burns of all degrees, received from

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many causes, and the results obtained are worthy of the effort expended. Steam, boiling water, gasoline, hot grease, electric, fire and mustard-gas are the causative agents in the cases of my overseas series, and the ambrine treatment was used with uniform results in all.

I have had no experience with the so-called ambrine paper.

The technique of dressing is important and must be carried out with care and precision, always bearing in mind the principles of the Carrel technique.

Steps of the dressing.—(1) Removal of dressing.

2. Bathing area with neutral sodium soap (warm or not).

3. Use of sterile absorbent cotton pledgets on sterile hemostat. These pledgets are soft and are similarly "soaped" and the whole area is cleansed, with a circular rubbing motion, from center to periphery-Thorough scrubbing of skin periphery.

4. Removing soap with warm sterile water and sterile cotton pledgets.

This cleansing process is one of the most important steps in the technique. There should not be any bleeding, pain or distress, and if there is any of these, the technique is not being carried out properly. Oftentimes the secretions are more easily removed by substituting normal salt solution for the sterile water.

5. Thorough and complete drying of the area, either with dry sterile cotton pledgets or by means of a blower. The area must be dry before applying the paraffin-wax.

6. Spray ambrine, or the paraffin-wax preparation, over the burned area and at least over a quarter inch of the peripheral skin.

7. On this layer of ambrine, place immediately as thin a layer or film of sterile absorbent cotton as possible to obtain from a roll, this layer likewise extending at least a quarter of an inch beyond the burned area edges. It is time-saving and more satisfactory to have these thin layers of cotton already prepared and placed between sterile waxed paper or in toweling, and then at the time of dressing, with sterile scissors the proper sized piece is cut off and placed on the first layer of the paraffin-wax.

8. On this film of cotton, spray a second layer of the paraffin-wax likewise extending beyond area edge.

9. Over this apply a thicker layer of absorbent cotton.

10. Then apply a layer of gauze and bandage. The amount of cotton and gauze necessary for the completion of the dressing can be judged from the amount of the secretions.

11. Redress every twenty-four to forty-eight hours, depending on the amount of secretion.

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12. Don't touch the wound or burned area with anything but the sterile cotton pledgets. Keep fingers off and out.

In concluding, may I recapitulate somewhat. All burns are sterile at time of their receipt; all burns are infected clinically and bacteriologically at least twelve hours after their receipt; the Carrel technique of handling burns is superior over any other method; the paraffin-wax treatment has proven its worth in every particular, both regarding the surgeon and also the patient, for time of disability is shortened, suffering is lessened, deformities and frightful contracting cicactrices are prevented, and the results are wholly worthy of the energy expended. I trust that other medical officers of the A. E. F. may have had some ambrine experience with mustard-gas burns, for I feel confident that the end results merit its addition to the Records of the Medical History of the World War.

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SOME OBSERVATIONS RECORDED IN A SERIES OF ONE HUNDRED AND FIFTY-NINE MASTOID OPERATIONS AT FORT RILEY, KANSAS; FROM SEPTEMBER, 1917, TO AUGUST 1, 1918

By Lieut. Col. P. D. MacNAUGHTON and Capt. GEO. W. SWIFT

Medical Reserve Corps

DURING the winter and spring of 1917 and 1918, 159 mastoid operations were performed at the base hospital, Fort Riley, Kansas. The number of cases reoperated was 26, making a total of 185 mastoid operations. The table below shows the cases divided into months as follows:

	No.	*Secondary*	*Total*
September	1	..	1
October	1	..	1
November	5	..	5
December	28	2	30
January	16	1	17
February	23	2	25
March	29	4	33
April	28	4	32
May	17	6	23
June	8	4	12
July	3	3	6
Total	159	26	185

TIME OF PATIENTS IN HOSPITAL

The average time for the recovery of the entire series was forty-nine days or seven weeks. Uncomplicated cases averaged five weeks. Several cases with severe complications remained over the sixty-day period. Practically all cases were up and about the ward on the seventh day.

TYPES OF OPERATION PERFORMED

The simple mastoidectomy was the usual procedure. In a fair proportion of cases the posterior superior wall of the external canal had to be removed down to the annulus, due to the extensive necrosis. Primary radical mastoidectomy was performed on 15 cases. Ligation of the jugular and closure of the lateral sinus was performed in 4 cases. Extensive exposure of the dura was done in 4 cases where the radiograms showed necrosis of the dural plate. Drainage of one extra dural abscess and one temporal lobe abscess was performed, both cases recovering.

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MORTALITY

Death from pneumonia, which was epidemic at that time, numbered 3 cases; septicemia from lateral sinus infection, 1 case; epidemic cerebrospinal meningitis, 3 cases; meningitis associated with, but independent of etitic disease, 4 cases; total deaths, 12; total deaths due to mastoid, 2. In connection with the above it is perhaps necessary to state that a large percentage of the cases of the series followed "flu" infection, many of them had had pneumonia before developing mastoiditis, and some developed the latter first and pneumonia, and, in a few, meningitis later. All the 12 cases that died went to autopsy, so it is possible to give the exact pathological findings. The three cases that died of pneumonia showed the characteristic changes in the lungs and a perfectly clean granulating wound in the mastoid with no complication from that source. The 3 cases of epidemic cerebrospinal meningitis showed the same normal healing process in the mastoid wound as the former cases.

In the case of general septicemia from lateral sinus infection a large clot was found in the sinus; this was removed and the autopsy showed endocarditis and a liver abscess. In the four cases of meningitis which were independent of etitic disease the dura was not exposed in the operation, and at autopsy the bone overlying the dura was in a healthy condition, showing no communication between the diseased portion of the ear and the dura. The dura on the operated side was in no worse condition than at more remote points, but there was evidence of sphenoidal infection.

COMPLICATIONS

Hearing.—The cases where radical mastoidectomy was performed were of the chronic type of suppurative otitis media, and the hearing was practicllay nil in all before operation and was not altered by the operation. Practically all simple mastoid cases recovered hearing to normal.

Facial nerve.—In 8 cases the facial nerve was involved; complete facial paralysis, 4 cases; partial facial paralysis, 4 cases. Of the partial paralysis 2 recovered. Of the 4 cases where complete paralysis occurred, 2 were extensive operations involving the labyrinth. Both cases recovered but lost the function of the labyrinth; they were of the chronic etitis media type with acute mastoid involvement.

Brain abscess.—In one case an extra-dural abscess was drained three weeks after a simple mastoid operation; recovery. The second case was an etitis media of chronic suppurative type of fifteen years duration. A sudden mastoiditis developed and the case was operated. Two days

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later the pulse and temperature dropped to below normal; terrific headache, nausea and vertigo suggested a brain abscess. The dura was exposed and about a dram of pus was evacuated from within it. Two days later the patient suddenly became unconscious and a needle was inserted deep into the temporal lobe, evacuating a small amount of foul pus of a green color. The brain was incised, a tube inserted and a half-cup of pus evacuated, following which the patient made an uneventful recovery. The labyrinth had evidently not functioned for a long time, as good compensatory function had been established on the opposite side. The Barany tests showed no nystagmus from the operated side, no past pointing or falling sensations. Normal findings upon stimulation of opposite side. His history gave no clue as to the time of first labyrinth involvement, but the canals were not involved in the operation and one must assume that it was of long duration.

Erysipelas facialis.—This complication occurred in nine cases, none of which were serious. They all showed sluggishness in granulating and required several curettages. Applications of magnesium sulphate (saturated solution) was found to be the best remedy in these cases.

Parotid gland.—This gland was frequently involved and accounted for two cases of facial paresis, both of which recovered in about six weeks. The infection extended to the gland from the canal through the fissure. Careful toilet of the canal with iodine applications in cases where the streptococcus viridans was present in the canal was found efficient in preventing this complication. Opening the canal with a narrow bladed knife through the cartilage and inserting a probe through into the gland tissue, thereby establishing drainage, was all that was necessary. If the knife is inserted too deeply, a fistula is liable to result; they are difficult to heal. The first symptom of the glandular involvement is the inability to open the mouth. One is liable to diagnose this complication as one of mumps, especially in soldiers who have recently been exposed or where a case of mumps has developed within the ward.

Meningitis.—At Fort Riley, as at many other camps at that time, there existed an epidemic of meningitis (cerebrospinal), and it was only to be expected that cases would develop in any of the wards at any time as the patients came from the same camp and organizations in which the disease was prevalent. Notwithstanding the fact that every precaution was taken to limit the spread of this and other contagious diseases, there was bound to be some exposure, and this accounted for 8 cases in this series.

Of the meningitis of otitic origin there was but one case in the whole series. One case developed bronchitis, pneumonia, otitis media, mas-

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toiditis, meningitis, and had recovered from all infections until meningitis took him off. Another entered the hospital with influenza; on the third day pleurisy was found. On the same day the left ear began suddenly to discharge; he was transferred to the Section of Head Surgery and on the sixth day a fulminating mastoiditis developed and he was operated on. The tip was literally blown away by necrosis. His temperature was irregular and suggested lateral sinus infection, and on the tenth day the jugular was ligated and the sinus packed off. His plural condition became gradually more pronounced and pneumonia of the lobar type developed. He died on the twenty-fifth day after his admission. Postmortem examination showed pneumonia, peritonitis, meningitis involving both hemispheres of the base; the dura over the temporal lobe was exactly the same on both sides and was not involved as in otitic meningitis, that is, there was no evidence of a localized infection, which can usually be easily demonstrated.

The third case began with follicular tonsillitis, followed a week later with pain in the ear and mastoid area. The third week after operation he began to complain of pain in his head on the operated side. The mastoid wound was nearly healed on the fourth week, when he suddenly became delirious and a spinal puncture showed streptococcus. He died on the following day. Postmortem showed no changes about the temporal lobe, but a diffuse meningitis over the base and both hemispheres. Case 4 developed the earache after being in swimming. He was treated for seven days. A threat culture showed streptococcus in large numbers, double plus, on admission to ward. The drum was not markedly infected, but there was tenderness over the mastoid area. He was not operated, and the symptoms were apparently subsiding when meningeal irritation developed. The spinal fluid showed pneumococcus type 1. He died on the eighth day of meningitis. There were symptoms of cerebral abscess, *i. e.*, headache, subnormal pulse and temperature, but the post-mortem showed the mastoid cells full of fresh pus, the dura intact, no apparent site of entrance and a diffuse meningitis over base and both hemispheres. This case was not operated, but we include it in the series as a good example of the complications encountered.

These four cases show no conclusive evidence of the origin of the meningitis, but do show that they differ from the one case of a true otitic meningitis. In the case of otitic meningitis a localized meningitis of distinct otitic origin was demonstrated. Microscopic examination of the tissues might be necessary to prove that the other three cases did not originate from the diseased mastoid, but other factors may be considered. Meningitis is a complication in pneumonias, probably by way of the blood stream. The mastoid infection, if the result of a blood-

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stream invasion, could be associated with meningitis, in which case the lowered resistance and the operation would tend to favor almost any complication. Many mastoids show a localized meningeal irritation, which, when the dura is exposed, promptly subsides. Should these cases be neglected we believe they would develop a true otitic meningitis. The cases that developed meningitis in this series independent of the mastoid disease, we believe, were a blood-stream invasion. Early in this series it became apparent that the tonsil played an important rôle in the infections of streptococcus type. As the number of cases increased in which a fulminating tip infection presented itself with no middle-ear involvement the idea that the infection was of the blood stream began to impress us. In the next twelve cases blood cultures were taken before operation was performed and streptococcus hemolyticus was found in eight. In many of the previous cases, where no blood cultures were made previous to operation, the cultures made after operation showed streptococcus present for weeks after the mastoid condition had subsided. This led us to the conclusion, which was, of course, supported by postmortem findings, that mastoiditis is not always due to direct extension from the nasal and pharyngeal mucous membranes via the eustachian tubes; that the tonsil is the usual seat of infection of the blood stream; that otitic meningitis is a rare complication; that a general meningitis may occur with mastoid infection and be independent of the mastoid infection.

DIAGNOSIS

Headache.—Temperature, blood counts, pain, tenderness and swelling are all of great importance in diagnosis of mastoiditis, but are unreliable. This series has demonstrated to us that there is one symptom associated with otitis media or mastoiditis that is of the utmost importance, *i.e.*, the headache. It is always present and does not respond to medication; after operation the headache disappears, but as soon as meningeal irritation takes place or as soon, in fact, as extension from the mastoid to the surrounding parts begins to take place, even if the infection has not yet reached the dura, headache will be complained of. It may be located adjacent to the affected side or it may be reflected to any other part of the head; later when the meninges becomes involved there may be tenderness over the tri-facial area and the teeth are likely to ache and the gums to become tender.

When headache persists for several days after operation and cannot be relieved by drugs, or when it makes its appearance after operation on the mastoid it is time to consider uncovering the dura.

Of course the pain, swelling, tenderness over the mastoid are inval-

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uable in making the diagnosis, as are the temperature and blood count. The temperature is not constant and may be subnormal or normal in the late stages. The pulse was more reliable than the temperature, and the blood count showed in most cases increased leucocytosis, but in cases where there was an old chronic middle ear infection with much ebonization in the temporal bone the diseased area was so well walled off that the increase of white cells was negligible. In these cases the headache, due to pressure, was always present and was a great guide to the surgeon. The headache of course did not necessarily mean mastoid disease, for it is a constant associate of almost all sinus infections.

Blood counts.—On 50 cases of acute mastoid infections the blood counts showed an average of 13,350 whites; those caused by streptococcus, 14,060 whites; those caused by pneumococcus, 11,025 whites.

Organisms.—The organisms taken from the mastoid cells at time of operation showed, in 50 cases: Streptococcus, 38 or 76 per cent; pneumococcus, 8 or 16 per cent; mixed infections, 4 or 8 per cent.

Radiograms.—One of the most important aids in diagnosis in mastoiditis is the X-ray. In a series of radiograms, Lieutenant Kirkline, who conducted that branch of the work in the Surgical Section, demonstrated that there is a marked symmetry of the two sides in the normal mastoid; the cellular structure of the right side is almost identical with that of the left. Pathological changes were always demonstrated; even slight changes in the cellular structure were demonstrable. This is of great advantage to the operator in giving him a fair idea of the extent of the diseased process. After the case is up and about it is well to have a second radiogram to show the completeness of the operation; also the return of one symptom, a persistent headache, is the indication for another radiogram. The radiogram will show; (1) The symmetry of the two sides; (2) the appearance of acute mastoiditis; (3) chronic mastoiditis; (4) post-operative results, faulty; (5) post-operative results, good.

TREATMENT

Two points of interest have been noticed with reference to treatment: (1) Regarding the use of Carrel-Dakin solution and dichlorazine paste; (2) serum treatment.

Carrel-Dakin solution is of great help in cleansing the wound of secretion.[1] Its use constantly causes great irritation to the middle ear, tympanum and canal, but it may be used every second or third day with safety. Dichlorazine paste is very effective in the after care of the

[1] It would be interesting to know definitely as to the preparation of the Carrel-Dakin solution employed in these cases—as to whether exact titration was used to determine the chlorine content. Carrel has always claimed that this solution, when the normal titre is used, is non-irritating.—EDITOR.

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wound; it should be used fresh, beginning with the third dressing. It is easily applied and causes no discomfort, aids in the granulating of the wound keeps down the odor, and hastens recovery.

Serum.—All cases of blood stream streptococcus infections should be given antistreptococcus serum intravenously for several days after operation. It is best given in 25 c.c. doses every three or four days; there is but little reaction, and it is remarkable how quickly a fall of temperature will follow.

CONCLUSIONS

1. The tonsil plays an important rôle in the etiology of mastoiditis of acute type.

2. A primary focus developing in the mastoid area is of acute onset; rapid destruction of bone is the result.

3. Other foci of infection frequently occur at the same time, such as pneumonia, meningitis and toxic joints.

4. The most reliable diagnostic symptom during the entire course of mastoiditis is the persistent headache.

5. The value of radiograms before and after operation depends upon the technique and interpretation. They should form a part of the preparation for operation and of the after treatment.

6. Meningitis due to extension from the mastoid has been very rare in our series.

7. Meningitis due to blood stream infection of the streptococcus type frequently occurs in those cases where the mastoiditis is also due to blood stream infection.

8. Exposure of lateral sinus and dura and breaking through of same during operation are not serious accidents, but, of course, should be avoided where not necessary.

9. Ligation of the jugular should be anticipated at any mastoid operation.

10. Carrel-Dakin solution and dichlorazine paste are of great benefit in the after treatment.

11. Serum treatment is of no avail when the radiograms show involvement of the cells; it is of great benefit after operation when a septic temperature follows.

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MASTOID OPERATION UNDER A LOCAL ANESTHESIA; REPORT OF FOUR CASES

By E. D. TWYMAN, M.D., and A. A. S. GIORDANO, M.D.

(With three illustrations)

Case No. 1: Ormund Ormundson. Permit No. 1392, sailor, aged 29, entered 10–22–'19. Acute mastoiditis superimposed on influenza with broncho-pneumonia. White count 20,000, of which 86 per cent were polymorphs. The ear was lanced, but the mastoid condition did not improve. Ninteen days after admission mastoidectomy was done under local anesthesia, consisting of injection of ½ per cent novocaine solution with adrenalin plus the administration of two hypodermics of morphine sulph. (gr. ¼ one hour before operation, and gr. 1/8 one-half hour before).

X-ray of the left mastoid showed diminished radiance (Fig. 1). Cultures of the pus showed staphylococcus albus. Recovery and healing were continuous and satisfactory.

Case No. 2: Adolph Flamein. Permit No. 1422, sailor, aged 21, entered 11–5–'18. Four days previously began to have mastoid symptoms, complicating the influenza and broncho-pneumonia already under treatment. He was transferred to the surgical side November 15, 1918, and operated on by the same method as Case No. L. X-ray of the right mastoid demonstrated the involvement by diminished radiance (Fig. 2). Cultures staphylococcus albus. Recovery was satisfactory and complete.

Case 3: Chas. Mabie. Permit No. 1720, sailor, aged 21, admitted 11–26–'18 with influenza, broncho-pneumonia resulting. Otitis media developed 12–8–'18 the drum rupturing next day spontaneously. December 11, 1918, the mastoid symptoms were acute and alarming—temperature 40.6° C. As the plate is broken the X-ray report of Maj. A. D. Foster is appended: "Radiological examination shows diminished radiance in the right mastoid region, indicating pus or granulation or both in the mastoid cells." Staphylococcus albus was reported on culture. Operation was done as in the previous cases. There was recurrence of fever four days after the operation, subsiding the second day after. Further recovery was uneventful.

Case 4: Michael Wirth, draft soldier, aged 23, permit No. 1867, diagnosis epilepsy and chronic otitis media with sclerotic mastoiditis. He was operated on by the same plan on November 27, 1918. The bone was very dense; the wound healed well. The epileptic symptoms were not relieved. X-ray showed sclerosis (Fig. 3).

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Comment.—In 540 cases of influenza, there were six cases of otitis media with four cases of mastoiditis requiring operation (U. S. Marine Hospital, Staten Island, N. Y.). Three of the cases having signs of broncho-pneumonia, general anesthesia was considered to be contra-indicated. The other, a chronic case, was done by this method to demonstrate its feasibility. Investigation of the nerve supply of this region showed the following: To the external auditory meatus; auriculo-temporal branch of the mandibular division of the fifth nerve. To the mastoid integument, mastoid branch of the great auricular and posterior auricular branch of the seventh nerve. To the middle ear, tympanis plexus, which ramifies on the surface of the promontory. The plexus is formed by: (*a*) Tympanis branch of the ninth nerve; (*b*) small petrosal nerve, (*c*) small superficial petrosal, (*d*) a branch which joins the great superficial petrosal. Theoretically, the freeness of the nerve supply from various directions is discouraging for the success of the method; practically, the smallness of the area and the readiness with which infiltration could be done rendered it very easy.

Technique.—One hour before operation the patient was given morphine gr. ¼ hypo. Half an hour later an additional $^1/_8$ was injected. On the table, besides the endermic infiltration of novocaine (½ per cent with adrenaline), some of the ½ per cent solution was laid hypodermically and as nearly as possible subperiosteally, and an attempt was made to infiltrate with one per cent between the external auditory meatus and the perichondrium. It seemed impossible to know whether infiltration really decreased the sensitiveness of the bone of the mastoid process, whether the lack of sensitiveness was the result of the inflammatory process, or whether, indeed, it might not be the normal condition. However, but little complaint was made while the bone was removed in the following ways: After exposure of the process, a small hole was drilled with a hand trephine over the perforated space; with biting rongeours, the compact outer table was removed from the entire process. Pus was present freely in the first three cases. The cellular bony trabeculae were curetted out. Part of the posterior bony wall of the external auditory meatus was bitten out and some of the posterior wall of the process removed. The full limits of the process were exploited in each case and all of the cells broken down. In one case they were abnormally

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Fig. 2.

Fig. 1.

(To face page 102.)

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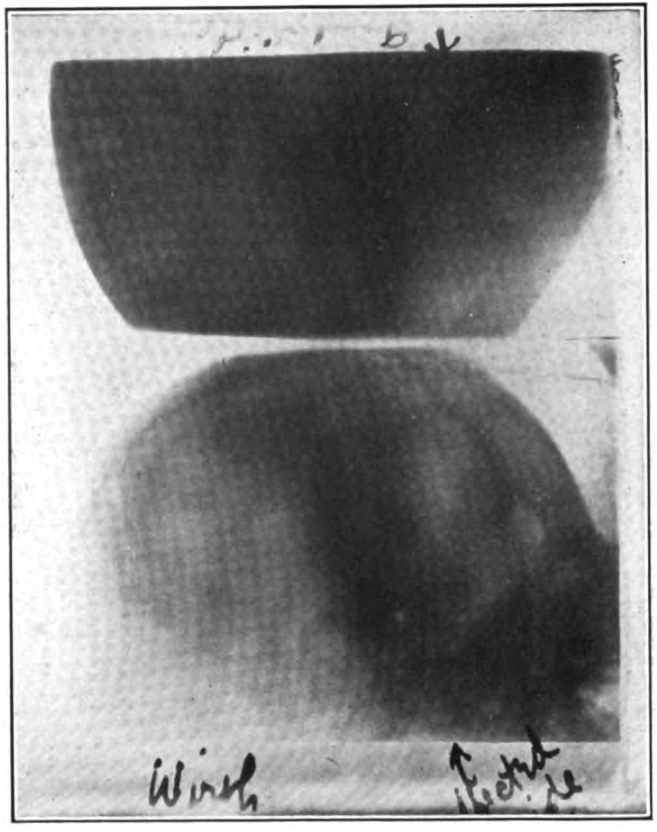

FIG. 3.

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extensive. The ossicles were not removed. The cavity was packed with iodoform gauze without sutures. In three of the cases, no ligatures were required for bleeding. Very little complaint was made by the patients during the work. The rongeour did better than the chisel and hammer, on account of the jarring of the head. There was little after pain, none of the patients requiring additional morphine. These patients demonstrated for us the competency of their respective facial nerves.

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EDITORIAL

A TRIP TO MARS[1]

In the Greek and Roman theaters, the mask of Tragedy with down-drawn mouth and scowling brow was counterbalanced by the grotesquely smiling face of Comedy. Fortunately, there is a funny side to most things, and in the midst of pain and sorrow and distress there is almost always somewhere a glint of the lighter side. What a good thing that it is so! Man could hardly struggle through all life and its burdens and anxieties with heart bowed down in woe. This same saving grace of humor keeps the balance just and cushions many of the sharp corners.

The report which we publish herewith is truly unconsciously funny. Of course it was a tragedy to the youngster who struggled with his refractory charges, despaired at delays and tried his best to meet situations which probably seemed to him as the camel did to the countryman when he remarked, "Hell! There ain't no such animal!" Those of pessimistic trend should not accept this tale of woe as an index of the way things were done "over there." Hard situations were met with forethought and resource, and work which could not be accomplished *was* accomplished. We have in this report of transport the narrative of a young man who started out to do a piece of work to which he was unaccustomed. What is to the point, he did it, suffer though he might in the doing, and we are sure that by the doing of it he was thereafter a better and more resourceful officer. Trials add to the strength of those who are tried.

The reading of it puts us in mind of Kipling and his "Big Drunk Draft," and we have wondered if by any chance this American youngster was fortunate in having any saving Mulvaney rise up from alongside the right of way and direct his feet in the path they should tread. Perhaps, and probably not. If so, then the more glory to the youngster that he should have wrestled his ambulatory convalescents to their

[1] In justice to the French as well as ourselves, it might be well to say that this was a very unusual experience. The train was not a hospital train—it was just an ordinary improvised troop train and, in furnishing it on our request, the French could not guarantee a fast schedule or direct route to Mars. Under ordinary circumstances the trip could have been made in twelve hours. These convalescents were sent from Chaumont to Mars in order to provide additional space near the front for battle casualties flowing in in great numbers at that time. In fact traffic was so congested that trains on the main lines were running on twenty-minute marches, *i. e.*, a train coming through a fixed station every twenty minutes. It is quite evident that the roundabout route followed, prescribed by the French for this special train, was an attempt to avoid main lines of traffic. Lastly, it should be said that one of the great achievements of the war was the efficiency with which the French utilized her limited railroad resources and coördinated the traffic activities of all the Allies fighting in their contiguous territory.—A. D. Tuttle, *Colonel, Medical Corps, U. S. A.*

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ultimate destination all by his lonesome self. When we read the things which happened in this deliberate journey, one after the other with discouraging persistence we are inclined to view the trip as Joe Webber did the comments of his tall associate Lew Fields. After the latter had enlarged and elaborated on his mental, moral and physical shortcomings until he was entirely out of breath, his little partner looked up at him and in a complacent tone of voice asked, "Well, aside from that I am all right, ain't I?" And so, aside from the many tribulations which beset his passage, this young medical officer did in the end turn over his charges to their destination. More power to his arm next time.

We invite attention to the footnote and would say that it carries our opinion also. The narrative set forth carries no stigma to our good friends the French, and I know many whose sense of humor would be appealed to by it.

JAMES ROBB CHURCH.

HEADQUARTERS BASE HOSPITAL 15, A. E. F.

5 September, 1918.

From:
To: The Commanding Officer, Base Hospital 15.
Subject: Report of trip to Mars with patients.

1. The convoy consisted of one medical officer, a sergeant and seven men of the Medical Corps and 388 convalescent patients, starting in nine cars, one a double car.

2. Left Chaumont about 8.30 a. m., August 30. Train pulled out before patient's rations were loaded. Conductor, who was of the Engineer Corps of the A. E. F., was notified that the rations were not on board and agreed to switch the train over to track No. 1, where the rations were at the time, to load them. The train pulled out into the yard and backed into another track, picking up another detail of American troops, and then pulled out immediately, refusing to stop or return for the rations to be loaded. Rations were placed immediately on an ambulance, which overtook the train 10 or 15 miles up the line where the rations were taken on board.

3. The train proceeded slowly. Late in the afternoon Nuits-sous-Ravieres was reached, at which place we were side-tracked for five hours. Bread was short here, and I purchased 74 francs worth from French authorities.

4. After this stop of five hours, instead of being routed to Nevers we were directed toward Paris. When we arrived at Sens it was discovered by the French authorities that we were on the wrong road. At this place we were side-tracked for seventeen hours and our engine detached; reached there at 3 a. m. and left about 8 p. m.

5. Food supplies were exhausted before reaching Sens, so upon request the French authorities issued a half ration for 397 men, for which no charge was made.

6. At Sens I made repeated inquiries of the French *Chef de Gare* as to when we could leave. He gave me no satisfactory answer as to when an engine could be procured. During this seventeen hours I counted more than one time six idle engines in another yard, just across a fence. When asked if one of these engines could not carry us away I was told that they belonged to another company and could not be used for this purpose. On asking why we could not be sent out attached to another

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French train I was told that we had too many cars to be handled thus and not enough for a special engine, so we would have to wait until they could make up a whole military train. After about fifteen hours at this place I called the American R. T. O. at ———, who immediately got in touch with American headquarters at Tours, reporting the state of affairs. I left word for him to call me through the French Military *Chef de Gare* and report as to what could be done toward getting us out.

7. A couple of hours later I went back and called him again; the French captain in charge of military dispatching was in the office at the time and, hearing the conversation, immediately began inquiring what we wanted. Upon telling him personally the state of affairs and how long we had been there, he asked why we had not let him know it before, saying that he was in charge of the dispatch of military trains and could have gotten us out at any time. He then gave us instructions, before hearing from American headquarters, to board the train immediately, saying that he would have us out in twenty minutes. In about an hour he had us switched over to the other yard where the idle engines had been standing, and about two hours later we were pulled out. The captain seemed to be disturbed because we had inquired of the *Chef de Gare* instead of him as to how to get out. He seemed to think that he had been disregarded in the matter. I thought that it was his place to look after us rather than ours to look him up, if he were in charge of the military trains passing through the station.

8. Alongside of us during these seventeen hours of waiting at Sens was a French military train, while another detachment of French soldiers was attached to our train; also, alongside was a trainload of wine. While I was down at the station office inquiring as to when we could get out, a French officer reported to me that my men were tapping the wine casks on the train alongside ours. I asked him to put on a guard, which, after a long while, he agreed to do. Upon investigating the matter I found that the French soldiers were drinking the wine, or taking it and selling it to our men. The latter seemed to tire of buying and, realizing that the wine did not belong to the French soldiers, then joined them in purloining and drinking it. This I put a stop to on returning to the train.

9. From Sens we proceeded to Montargis, ariving there about 1 a. m. of September first. We were sidetracked in that town for five and a half hours. One of our cars going bad was taken off here, and the men doubled up in the remaining cars.

10. We pulled out at 6.30 a. m., arriving at Nevers at 11.45 the same morning. The engine was again detached. At this time the convalescents had not had food for twenty-four hours and were very tired and hungry. Some were given permission to visit the Red Cross house for coffee and sandwiches, which they were informed would be furnished them there. I told the boys to remain near the train while I went up to the American headquarters in Nevers to procure rations or another engine to pull us out of there. We were told that we could not get out until 5.30 p. m. The American quartermaster supplied us with four hundred rations. Upon returning to the train I found that about two-thirds of the men had left it; some had gone to town, some to the Red Cross, or to any place where they thought they might obtain food. Those remaining at the train discovered on a nearby track a French car loaded with grapes, cheese, sardines and other food supplies, which car they broke into and made use of the food contained therein. I counted fourteen baskets of grapes, two of tomatoes, four crates of sardines and two of cheese that had been opened and the contents consumed. The American quartermaster came down and took a report of this.

11. At this place (Nevers) our train was backed into the yard on the wrong side

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track, three cars being derailed. It being impracticable to keep the men in these derailed cars, and almost impossible without an armed guard, I requested that the American quartermaster captain taking a report of this damage furnish me with an armed guard; this he refused to do. Guards placed on duty without arms proved of little benefit, and the only way the men could be controlled was by standing there personally and doing it myself.

12. Finally, when the train was pulled into the Nevers station, it was learned that all the men had not returned, and some of those who did return were drunk or drinking. A detail was sent out into town to round up the absentees and make them return; most of them complied with the demand. The train left this station at 6 p. m. of the day of arrival (September first) and reached Mars, *a distance of about* 10 *miles*, at 1.30 a. m. of September second.

13. The three cars, including the double one, which had been derailed at Nevers and rendered unavailable for further use, were taken from us and one very small car supplied us to replace them. This left seven cars in which to complete our journey, and, in addition, at Nevers eighty-two other patients and two men were added to our detachment to be transported on the same cars. It being impossible to put all the patients in the cars, many were forced to ride on the running board of the cars and the engine, making the trip difficult and dangerous.

14. There was quite a little scrapping among four of the men on the way from Nevers to Mars, details of which were reported to the authorities of Base Hospital 85, at Mars, the necessary proceedings to be carried out by them.

15. The railroad station at Mars is about 1½ miles from the hospital. The hospital locomotive was not fired up, consequently trucks and ambulances were sent down to transport patients who could not walk up to the hospital. This was completed at 3.30 a. m. The patients being tired and hungry and the hour inconvenient, they were permitted by the receiving officer of Base Hospital 85 to go into the wards and retire without being checked in or formally received.

16. About twenty of the patients who did not report back to the train before we left Nevers came down by train early next morning (September second) and reported at the hospital.

17. Two other details of patients arriving at the same time with our main detachment caused quite a lot of trouble in checking up the next day; this necessitated our remaining at this post twenty-four hours for the final report and receipt for our patients. It was ascertained from the morning report of September third that all of my patients in round numbers except two were present. I got a receipt for the number, though not one according to names, and the registrar stated that he would send me by mail, in a few days, the names of the two patients still absent.

18. The buckets and cups which were taken with us had been distributed in the different cars. Many of them were found to leak on account of the bottoms coming unsoldered and were left in different towns by the patients and the men who used them for carrying water. Only three were observed to be on the train on arrival at Mars, two of which were leaking. These the quartermaster of the hospital said that he would gather from the train, as well as anything else left by the patients.

19. Sergeant —— was placed in charge of the seven men of the Medical Detachment and directed to board an American express for Chaumont, which was due to pass through Nevers the night of September third—at 1.17 a. m. This train did not run at all, so the military police then gave the sergeant a return *ordre de transport* by way of Paris, it being impracticable for the party to wait twenty-four hours for another express. They reached Chaumont the night of September fourth-fifth.

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20. After obtaining my receipt and learning that there was no possibility of obtaining a seat on the American express, which was then twenty-four hours late, I boarded the Paris express, which arrived in the capital at 8 a. m. September fourth. I left at 8 p. m., arriving in Chaumont at 5 a. m. September fifth.

21. The above is practically a detailed report of my trip with hospital convalescents from Chaumont to the Hospital Center at Mars.

22. Hereafter it is recommended that hospital trains of this size of convalescent ambulatory patients be furnished with not less than four armed guards, it being practically impossible for enlisted men not armed to control them.

23. To save unnecessary delay in checking up patients delivered in mass to other hospitals it is recommended that an alphabetical list accompany the patients.

Signed, ————,
1st Lieutenant, M. C.

RESTORATION OF THE RECORD OF COLONEL JOHN VAN R. HOFF, MEDICAL CORPS, U. S. ARMY, RETIRED

It is with pleasure that THE MILITARY SURGEON learns of the restoration of the military record of Col. John Van R. Hoff, M. C., U. S. Army, Retired, formerly Associate Editor of THE MILITARY SURGEON, and there is no question that the same news will be equally gratifying to all his friends, which is to say, those who know or have known him. This information is contained in the subjoined memorandum from the Secretary of War to the Chief of Staff:

WAR DEPARTMENT
WASHINGTON

December 20, 1919.

MEMORANDUM FOR THE CHIEF OF STAFF:

In July, 1918, Colonel John Van R. Hoff, Retired, then editor of THE MILITARY SURGEON, published an editorial in that magazine which was brought to my attention as being subversive of the sort of cooperation which ought to obtain in the military establishment in the period of active hostilities. By my direction a reprimand was administered to Colonel Hoff (see paragraph 86, S. O. 179, W. D., 31, 1918).

Under date of November 11, 1919, Colonel Hoff wrote to the Adjutant General of the Army on the subject of the withdrawal of the reprimand, and requested not only the withdrawal of the reprimand but his own restoration to active duty.

I have examined this whole question afresh and in the light of the more composed situation which exists now that the war is successfully terminated. I am clear that the caption of the editorial was unhappy, and that the body of the editorial might well have been misunderstood, but I am satisfied that the intention of Colonel Hoff's editorial was not undisciplined and antagonistic. In view of Colonel Hoff's long and honorable service, I desire to withdraw the reprimand and to have the withdrawal officially entered upon his record. In view of the fact that the Army is now substantially demobilized and retired officers are not needed in active service, Colonel Hoff's request for active service is denied.

(Signed) BAKER,
Secretary of War.

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We congratulate Colonel Hoff upon the receipt of this letter and the removal from his record of a stricture which could not have failed to hurt, and we congratulate the Secretary of War on a lordly action in the doing.

Only those who have given many years of faithful service in the uniform of their country (and Colonel Hoff has given nearly half a century) understand how precious a thing to a member of the armed forces is official reputation as sustained by the records of the branch which he serves.

This act of justice to an old and faithful soldier seems particularly happy at this season and we take this opportunity to congratulate Colonel Hoff upon the outcome and to wish that there may be for him many more years in addition to those which already stand in the record of his long, and honorable, and useful life.

THE EDITOR.

CORRECTION OF AN ERROR BY OUR PRINTER

On page 734 of the December issue, the title of the first Vice-President should be Surgeon J. W. Kerr, U. S. P. H. S., instead of Surgeon General J. W. Kerr, U. S. P. H. S. This, as well as other errors which appear in the same issue, are due presumably to the labor trouble which has been prevalent in all printing establishments throughout the country and to which the tardy appearance of the December issue must be charged.—THE EDITOR.

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ASSOCIATION NOTES

At a meeting of the Executive Council of The Association of Military Surgeons, November 14, the following names were proposed and elected to membership in The Association:

Medical Corps, U. S. N.

Lieutenant

Royal Knight Joslin

Medical Corps, U.S.N.R.F.

Lieut. Commander

Rutherford B. H. Gradwohl

Lieutenant

Richard P. Landis

U. S. P. H. S.

Assistant Surgeon (Reserve)

Clifford C. Oliver

Medical Reserve Corps, U. S. A.

Colonel

Robert B. Osgood

Majors

Louis M. Tomlinson

John Wehrly

Captains

Earl E. Heath

Baldwin L. Keyes

Dwight E. Long

Harry H. McClellan

Roger S. Parry

Frank Gay Sanders

First Lieutenant

Frank Andrew Mack

Medical Corps, U. S. A.

Majors

Raymond Clark

Henry B. Hitz

Frederick C. Kidner

Captains

Floyd L. R. Burks

Captains—Continued

George L. Converse

Duncan McI. Draughn

Edwin Eugene Endicott

R. R. Hogue

Foster C. Howard

James R. Hudnall

Karl H. Kellogg

Ward Holmes Leonard

George Mossman

Irvin A. Weichbrodt

First Lieutenants

John Browning Baldwin

Paul E. Beach

Ray Harmes Bechtell

Harry James Blount

Evans Lewis Huggins

John H. Revington

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COMMENT AND CRITICISM

COL. JAS. ROBB CHURCH,
Army Medical Museum,
Washington, D. C.

DEAR SIR:

Your editorial in the November issue of THE MILITARY SURGEON was pointed out to me by a friend who got the impression that it applied to our Army. Before I had seen the editorial, I entered into quite an argument with him, stating that all War Department reports pointed to the fact that no men were executed in the A. E. F. for crimes other than civilian crimes, and that the men so executed were hanged. The Judge Adovcate General's Report for this year also indicates this to be a fact.

Having read your editorial, I realize that it applies to the Army of Great Britain, based as it is on the report of the *United Service Gazette*, but I still believe that some American readers would get the idea that some of our soldiers were executed for dishonorable behavior or cowardice under fire. My suggestion is not intended to be critical but merely to indicate to you the fact that some people are associating the editorial with our troops in the A. E. F.

Yours very truly,

CARL H. BUTMAN, *Director,*
War Department News Bureau.

HOSPITAL SANTO TOMAS

On Saturday, November 15, the ground was broken by Doctor Belisario Porras, President of the Republic of Panama, for the new Santo Tomas Hospital, which is to be located in the suburbs of the city of Panama. A fitting and impressive ceremony was performed. The new institution, which will be in charge of Maj. Edgar A. Bocock, M. C., U. S. Army, is being constructed on the administrative plan by a commission of five members nominated by the President of the Republic to accomplish the construction work. The layout is contemplated to accommodate 600 patients and will be built of reinforced concrete and concrete blocks throughout.

The estimated cost of the new institution will be approximately $600,000. Separate hospitals for the care of tuberculosis, venereal and contagious diseases are included in the plans for the new institution. The equipment will be most modern in character and will include up-to-date X-ray facilities as well as electro and therapeutic apparatus.

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IN CASE OF INTERVENTION

Under a recent date line, a responsible writer in the *Washington Post* had an article on the front page of that well-known morning daily about Mexico. The article was unusually frank and direct. It stated in effect that intervention in Mexico by the United States at an earlier or later date (this was early in November, 1919) is a foregone conclusion; that plans for the same are going forward in the appropriate government departments. It seems that reverse English was being put on the Monroe Doctrine by certain foreign friends of ours who say to Washington, "You won't let us do it, so we're looking to you," or words to that effect. Also the United States is not without certain direct provocations extending over a considerable period.

Intervention in Mexico, if it comes to pass, is not likely to be merely a matter of a few months; a few years is more probable. During that time many thousands of men will be needed; troops for the advanced zone, the line of communications, at the base. There will be many problems in the event of such intervention, among them the very genuine one of venereal disease control. The Army knows there was enough need for such work in France. Ample need for it was found during the mobilization of the National Guard in 1916, and later during the mobilization of all the forces for the World War. The problem of the southern border cities and communities in this regard was not simplified by their Mexican population.

With the definite possibility looming ahead, intervention suggests the consequent need for venereal disease control measures. It suggests the question, "What can be done? What is being done?"

Did you ever notice on those communications you get from the Army the cryptic numerals and letters on the margin. That's the sign manual of the Army's numerical filing system. Anything the U. S. A. marks 726.1 ultimately will come to rest with the papers on venereal diseases. Owing to the Army's activities along lines of venereal disease control during the late general debate in Europe, Drawer 726.1 is a pretty full one, too. Now, while things are quiet, the contents of that drawer might be scanned and a few plans laid for special use. When and if the need arises, there will be a plan at hand and material on which to act without the loss of time incident to planning under pressure.

With the information now at hand on fighting the venereal plague, we can prepare to be fully ready when the time comes for using that knowledge. There wasn't much preparation in the Army along this line in 1917. The first troops overseas, the pick of our fighting forces, were not reached then by the special army instruction in the knowledge and avoidance of these diseases. It is well that the Y. M. C. A., with their

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Mexican border experiences fresh in mind, were on the job. Once "over there" the early divisions got so far ahead of the whole army program of instruction against venereal diseases, that they didn't begin to hear about it until after the armistice.

These diseases, the results of willful exposure, rob an army of more of men's services than any other peace-time cause of disability. But it is not the army alone that suffers. Army discipline aims to keep the contagiously infected quarantined; but, despite the sincerest efforts, the civil community is liable to suffer some spreading of the diseases. Concentrate an army for intervention in the southern part of this country; will the lure of the uniform be as strong as ever? Will its wearers enjoy a special regard? Will those who prey on the sex instinct seek the neighborhoods of the camps, as near as the laws will allow or ingenuity permit? And will the soldiers be excited by the military prospect, a little disorganized in mind, a little less careful socially? With the answer you will also have the reason for getting ready—or not.

Possibly you remember the indefatigable German youngster in Mr. Britling's care; and how he told that harassed gentleman that England would lose the war because the English didn't know how to use the information they had? In the present case of possible intervention, the idea is to get ready for the best possible control of the venereal disease problem by using the information we have. Get ready for the next move whether it be intervention in Mexico or any other activity the General Staff may indicate. If any feature of fighting venereal diseases can be added to what is becoming known as "The American Plan," add it. But the American plan, embracing proper forms of recreation, law enforcement against vice, education, public health measures, and Prophylaxis is well matured. Its application to a southern troop concentration could well be preceded by a few hours of special thought and more hours of material preparation. As a basis for consideration and as an exemplification of the thought behind this article, the following suggestions may prove interesting:

A. Personnel.—In carrying out an active fight against venereal diseases in the event of intervention to the south of this country, officers would probably be needed at the following stations: Washington, D. C.; Headquarters, Southern Department; cities along the border; key cities in the home country with expeditionary headquarters. The personnel to supplement the Regular Army officers for these posts could be selected now from the reserves experienced in the work. A tentative assignment on paper could be given. Alternates for the more important places should be listed, for all the experienced officers will not return to a job like this. There is, however, information on hand at the Surgeon General's Office to show which ones will accept.

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B. The General Plan.—Prepare a draft of a news article to be released at the appropriate time through the press. This account should set forth the needs of the hour for perfect civilian support of the Army's efforts to deal with the venereal diseases before harm is done the soldiers. Some praise of the work done in the Southern Department (and elsewhere) along control lines during the World War might well be included, together with pointed mention of the defects then uncovered. Sketch a brief review of the Army's plan, and include an announcement of the expectation of real effort at law enforcement by municipal, county and state officers. A series of such articles issued authoritatively, explaining the Army's objectives in controlling syphilis, gonorrhea, and chancroid and asking for public support should be effective.

C. Recreation for Troops.—(1) Study and list now the forms of sport and recreation found most successful in that climate during the two previous mobilizations in that area.

2. Schedule for the above the requisite paraphernalias on the basis of regimental needs.

3. Outline a model recreation and athletic program for one winter and one summer month.

D. Public Health Measures.—Maintain close liaison with the Public Health Service, especially as regards its work of fighting venereal infections along the Mexican border.

E. Prophylaxis.—The value of prophylaxis is undergoing close scrutiny and analysis. The results determined by the Surgeon General's Office may be made public later. In the meantime, however, the names of the enlisted men of the Medical Department proficient in the technique of actual administration of prophylactic treatments, in the care of stations, equipment and records, should be a matter of convenient record.

F. Education.—(1) Prepare at least two new sets of slides for the automatic stereopticons, based to some degree on the known facts regarding the prevalence of venereal disease among Mexicans. Illustrations should be obtainable from border city clinicians. Lieut. Herman Goodman, M. C., U. S. A., who has been indefatigable in applying American methods and ideals of venereal disease control in Porto Rico and later in the Panama Canal Zone, should be of real help in this work, after his experience with mixed Spanish-descendant types.

2. Secure the scenarios, at least, for one or two moving picture stories, featuring Mexican scenes, the story revolving around the clean man, as in "Fit to Fight."

3. Prepare a new pamphlet of instruction and appeal to the individual

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soldier. Give him in this the facts about the diseases themselves, but weave into in all the local color and historical interest that can be gleaned from the files on the Mexican War, the late Punitive Expedition, and the present objectives. Make it timely. Put pictures in it. Put some spark in the title and some colors on the cover. The proper kind of pamphlet will be read by the veteran as well as by the rookie, often more than once, and then, as in the World War, mailed back to some chum at home.

4. A pamphlet should be ready too for the men who will file through the receiving office into the venereal disease wards of the army hospitals—in a thinner stream than ever before in any army's history—but inevitably some. Such men need at least two things that a pamphlet can give: viz., a word on which they may build hopes of reasonably early recovery, and strong advice as to the necessity for the completion of treatment, however long, regardless of whether they stay in the service or get out before treatment is finished.

6. A broader and more far-reaching work along education lines might well be undertaken. Col. P. M. Ashburn's overseas study of the "Factors Making for a Low Venereal Disease Rate in the A. E. F." contains interesting conclusions that may be applied practically. Incidentally there is enough in that study to make American parents and teachers glad of the foundations they helped lay for those same boys that the colonel's study reached. They withstood attacks more insidious than the most fiendish gas; 3,000 miles away from home, alone, they won those battles with self in the dark, when voices within, without, urged them to the betrayal of their high ideal. Colonel Ashburn's report shows that the factors that kept American boys clean primarily were not prophylaxis, not punishment, not threats, not army regulations, not lectures. These were helpful in varying and minor degrees. The principal factor in this fight was character, the ideals the Yanks brought with them, something they had got long before they put on olive drab and were allotted an army serial number.

The average age for the Army during the world war was well above twenty-one years, and by that time a man's sex habits have been decided one way or the other. The effective age at which to influence that decision is long before twenty-one. Education in the knowledge of venereal diseases, their effects, and the numerous reasons for their avoidance is still effective, but certainly not at its maximum, at the age of twenty-one. So it is not claimed that the principal factor in keeping the venereal rate down in the American Army (and giving us another victory to be proud of) is an army product altogether. The large percentage of American soldiers avoided exposure to venereal infections

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because they remembered the training of their boyhood and of their adolescent years. They had a pride in their clean record. There was a "one hundred per cent" girl back home they were going to be worthy of. In many cases there was a wife and children to be loyal to and keep clean for. Reasons like these are the principal factor in making for a low venereal disease rate in France as found by Colonel Ashburn's study. Isn't the concentration of effort on the formation of character by the proper education along sex lines indicated by these findings? Certainly it would pay dividends far above increased numbers of effectives for military purposes. It seems that the above facts should somehow find nation-wide use through the Federal Bureau of Education and the United States Public Health Service, in furnishing the boys and girls in the late grammar school grades and in the high schools intelligent and sympathetic instruction in these matters at the time when they most need it and when it will be most effective.

There may be the germ of usefulness in one or more of these suggestions, but whatever the practical worth of these particular ideas, it is obviously desirable to formulate now a working basis for handling the menace of venereal disease in the event of military intervention in Mexico. With orders made ready now for the immediate calling to service of an experienced reserve personnel to assist the regulars who will handle this disease-group, a new record for promptness could be made. With plans for suitable materials well forward, the Medical Department of the Army could establish a new record for efficiency. The actual venereal disease-control resulting will be a dividend richly repaying today's investment.

NOTE.—Preparation of this article was commeneed early in November, prior to the tension developed over the imprisonment in Puebla, Mexico, of U. S. Consular Agent William O. Jenkins, which case is now (November 26, 1919) the subject of serious diplomatic correspondence between the two governments.

SIDNEY MORGAN,
1st Lt. Sanitary Corps, U. S. A.

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BOOK REVIEWS

THE ARMY BEHIND THE ARMY, by Major E. Alexander Powell, U. S. A. Illustrated. New York: Charles Scribner's Sons, 1919. Price, $4.00 net.

Major Powell was specially detailed by the War Department to write this work, and in the 470 pages which it comprises he gives us a most comprehensive and fascinating insight into the staging of the tragedy of war. In considering battles and campaigns we are apt to arrest our attention with the charging troops and the battery in action, taking for granted the means and methods which have made it possible for them to charge or fire. It is well to have brought to our attention the *vis a tergo* which, by painstaking prevision and prophetic foresight, makes effective the effort of the combatant troops.

Major Powell does this in regard to all the services which fall in the category of "auxiliary," and does so in such a way that we have a live narrative instead of a dry-as-dust marshaling of facts and figures.

From him we learn the why and wherefore of the Engineers, the Ordnance and the Signal Corps, of the Quartermaster and Medical Corps and the others which are the thews and sinews of the divisions in action. It is all readable and worth reading, and shows to the uninitiated that there is a methodical, hard working, inventive, resourceful background to those who fight and fall at the front.

The illustrations are numerous and instructive

As a medical man, we cannot refrain from quoting the following: "If America's losses in the greatest of wars were relatively slight—*and they were slight* when compared with the appalling casualties suffered by most of the other warring nations—the reason is not to be found in the superiority of American strategy, in the ability of American commanders, or in the excellence of American weapons, but in the efficiency, self-sacrifice, and devotion of the officers, nurses and men who wore the caduceus of the Army Medical Department. And I know whereof I speak, for I have not only visited French, British, Belgian, Italian, even German hospitals, all the way from La Panne to Montfalcone, thus affording me standards of comparison, but I spent nearly three months in an American hospital on the Marne, I came home on an American hospital ship, and for nearly three months more I was under the care of army medical officers in the United States. In dressing stations, field, camp, base, debarkation and general hospitals, I have watched the Medical Department at its work, and the first hand knowledge thus gained gives me the right to assert that it was the most efficiient service of its kind possessed by any army. To its officers and men, and to the devoted women of the Army Nurse Corps, I lift my hat in gratitude and admiration. The American Army and the American people owe them a debt which they can never fully pay."

JAMES ROBB CHURCH.

THOUGHTS OF A PSYCHIATRIST ON THE WAR AND AFTER, by William A. White, M.D., Superintendent of St. Elizabeth's Hospital, Washington, D. C. New York: Paul B. Hoeber, 1919. Price, $1.75.

Anything from the pen of one so eminent in his profession as Dr. White must command attention. In his little book, "Thoughts of a Psychiatrist on the War and After," he takes up and discusses from this standpoint the question of war and conflict both as to predisposing causes and the after effects of the condition itself. The book is divided into eight chapters which carry us from a consideration of the individual, with his personal tendencies and desires, through the evolution of the

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laws and regulations which are to govern when a condition of altruistic supervenes that of egoistic hedonism. In this connection he discusses the mental changes which are for the governing of a group or nation in comparison with those which solely affect the individual. He makes use in this connection of analogies based upon the mind of the child, the criminal and the insane.

It is quite evident from Dr. White's analysis that he is by no means a pacifist, although it is equally evident that he regards war, as do most all thinking men, as a doubtful blessing. He considers, as must also the thinking man, that it carries with it the possibility both for good and for evil; that while it is primarily a tearing down of social institutions there lies back of this phase the upbuilding of newer and better ones; further, that it should necessarily be an advance, since in the upbuilding of any structure new material must be added as an essential adjunct to that which has been salvaged from the old. Thus in the reconstruction of a particular social fabric consequent on the termination of a war, better principles should arise from what was a destructive process in the beginning.

It is evident from perusal of this little work that Dr. White has given thoughtful consideration to that question which agitates so much of the public mind today—the League of Nations. It is also apparent that he holds no brief either for or against it, but limits both condemnation and commendation by the conditions which shall be resultant from the conclusion of the war.

He dwells upon the effect economically of the conduct of the victor toward the vaniquished, and it is his belief that the further shaping of the conquered power will be dependent upon the attitude of the nation which is in the ascendancy. The treatise is thoughtfully written and contains much food for reflection.

JAMES ROBB CHURCH.

EXPERIMENTAL PHARMACOLOGY, by Hugh McGuigan, Ph.D., M.D. Illustrated with 56 engravings and 7 colored plates. Philadelphia and New York: Lea & Febiger, 1919. Price, $2.75.

In all teaching in recent years, particularly along the line of medicine and the kindred sciences, the tendency has been to lay more stress upon the clinical and experimental phase than upon didactic teaching. This book fits in with this idea, giving as it does a series of experiments particularly fitted to the student of pharmacology. In conjunction with lectures and text-book, it should give very complete working knowledge along the line which it is designed to cover. It is systematically gotten up, thorough in arrangement, well illustrated, and should be of much value in connection with lectures on the subject.

J. R. C.

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ORIGINAL ARTICLES

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CONSTIPATION AS AN ARMY PROBLEM[1]

BY CAPTAIN WILLIAM R. WOODBURY
Medical Corps, United States Army

(With five illustrations)

I

CHRONIC constipation is a common complaint in the Army. The failure to prevent it invites attention. In civil life it is impossible to get at the true facts of this common ailment or to control or correct it. In the Army comes the opportunity to get the facts, and to correct and prevent this unphysiological condition. Army men are a selected group, admission to which depends upon the result of a careful physical and medical examination. Every act, fact and feature of the soldier's daily life is controlled and regulated—food, exercise, clothing, work and sleep. Both the men and the conditions are closely supervised every hour of the twenty-four hours of every day. Army regulations determine and control every act in the daily life of the soldier, save one. Irregular or missed bowel action not infrequently unbalances the day's work. Retained and accumulated intestinal waste held within the body lowers fitness; it puts a drag upon physical and mental energy. Habitual constipation makes low-powered, substandard men.

"Constipation is better than diarrhea," is an old military adage. In the War of the Rebellion "constipation was the most frequent of the diseases of the digestive organs." During the five years ending June 30, 1866, there were reported 145,960 cases of constipation among the white troops, an equivalent to an average annual rate of 65.5 cases per thousand of strength. Among the colored troops the cases of constipation numbered 17,204, or 93.8 annually per thousand.

These figures represent only the more serious cases. Those occurring

[1] Authorized by Col. Roger Brooke, Chief of Division of Internal Medicine, Surgeon General's Office.

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in the hospital population are not included.[2] "The number of reported cases of constipation is so large that it must give a very just idea of the actual distribution of this condition among our troops."[3]

Not infrequently constipation is a fore-stage of diarrhea or dysentery. Without the presence of the fecal masses a part of the material for decomposition would be wanting; the process of reduction would not attain the intensity; their products their acrimony; nor the irritation the local duration and mechanical increment necessary to generate a fully developed dysentery. A condition which results in the retention of the intestinal waste, and thus extends the time for the completion of the retrogressive process, intensifies irritation, and aids in establishing inflammation. The unhealthy alimentary conditions are determining momenta of irritation to the intestinal mucous membrane. In a general way the ingestion of large quantities of any food which is difficult to digest may cause intestinal disorder, but the condition of the individual is often more important than the character of the food. That which is disposed of readily by robust digestive organs may be wholly unmanageable by men whose digestive functions are in any way impaired. In army reports a form of diarrhea is recorded which is common among newly enlisted men, and which is preceded by several days of constipation.[4]

In the War of the Rebellion the summer rates of constipation were larger than those of the winter months. "The increased prevalence of constipation in the summer may be attributed to the irregularity introduced into the personal habits of the men during this season of active campaigning. Even the calls of nature were often deferred on the march or other toilsome service until a more convenient opportunity, which, when presented, not infrequently found nature irresponsive. Certainly many of the cases thus originating culminated in a subsequent diarrhea, which was reported, although the preliminary condition of constipation remained unnoted."[5]

Dr. Woodward makes record of the fact that precisely where diarrhea and dysentery were least frequent constipation was most prevalent. The average annual rate of constipation in the region of the Pacific was

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[2] "Every soldier excused from duty even for a day is placed on sick report. A soldier suffering merely from constipation, who receives a purgative from the medical officer, is reported as a case of constipation if excused from duty."—Medical and Surgical History of the War of the Rebellion, Part Second, Medical Volume, p. 632.

[3] Medical and Surgical History of the War of the Rebellion, Part Second, Medical Volume, p. 632, and Part Third, Medical Volume, p. 873.

[4] The conditions favorable to proper digestion are wholly abolished when unpleasant feelings, such as worry, anxiety or vexation, or great emotions, such as fear, prevail. Obviously, the spastic visceral states should be relieved. Drastic purging causes a reaction unfavorable to orderly digestion.

[5] Medical and Surgical History of the War of the Rebellion, Part Third, Medical Volume, p. 873.

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132, in the region of the Atlantic, 70; in the Cetral region, 60. Whereas the fluxes were least frequent in the Pacific, and most frequent in the Central region.[6] An investigation was made. The Pacific region was garrisoned by an average strength of about 10,000 men, or less than one-fortieth of the troops from which the medical statistics of the war were gathered. This garrison was exposed to few of the hardships and toilsome duties to which their comrades on the eastern side of the continent were subjected. Minor ailments came up for sick report. "Constipation was more frequently reported, although not of necessity more frequent in its occurrence, while diarrheas were less prevalent, in part at least, because of the increased attenton paid to the preliminary condition of constipation."[7]

These facts point to the connection between torpidity of the bowels and diarrheal conditions. This relationship is of practical concern for the sanitary officer and the clinician.

Chart[8] A shows the prevalence of constipation, headache and neuralgia per thousand of strength in the War of the Rebellion for five years, 1862–66. The most frequent of the diseases of the nervous system, in that war, was headache, with neuralgia following closely in order of frequency. The parallelism of the lines of constipation and headache is noteworthy. "It suggests that the Army might have been preserved from much of its sickness reported under the term headache had the causes of constipation been better known and more effectually shunned. Neuralgia seems to have been due to conditions in which the individual rather than his surroundings constituted the prime factor."[9]

In the International Nomenclature constipation is not recognized, by title, as cause of admission to sick report. Only exceptionally is it listed in army reports.[10] In 1916 at the United States Military Academy, at West Point, there were 663 hospital admissions, of which 152, or 22.92 per cent, were for diseases of the digestive system; and 52 (quite one-third) were admitted for "constipation." For the same year (1916) constipation is reported as one of the principal diseases for admission to sick report among the United States troops in Alaska, with an admission rate of 4.03 for enlisted men. Alaska is the healthiest region in which the Army is stationed. In the Philippine Islands the admission rate, for the same year and the same cause, was 27.63; in Hawaii 20.65, and excluding venereal diseases, constipation showed the highest admission rate of all the principal diseases. With the

[6] *Ibid*, Part Second, Medical Volume, p. 632.
[7] *Ibid.*, Part Third, Medical Volume, p. 874.
[8,9] Medical and Surgical History, War of the Rebellion, Third, Med. Vol., p. 874.
[10] Report of the Surgeon General, U. S. Army, 1917.

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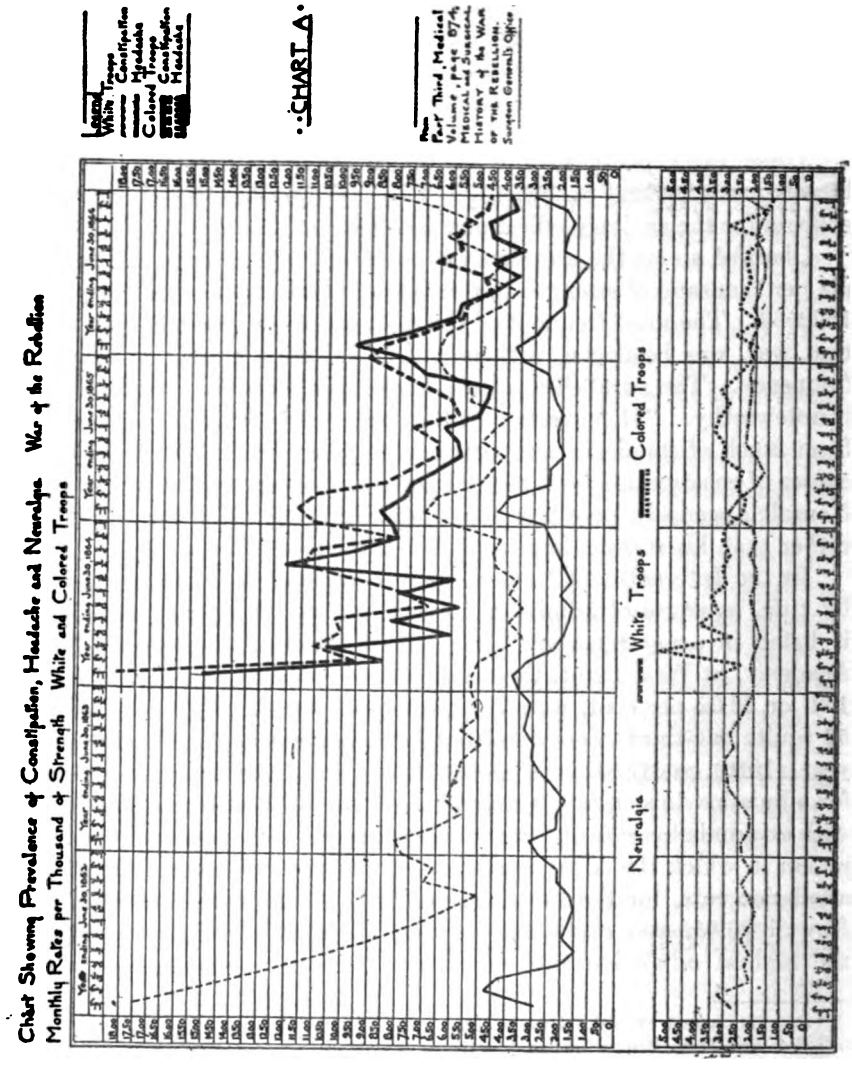
United States troops serving in China, the mean strength of all troops, including officers, being 1,369, the admission rate for enlisted men with constipation was 83.15 for 1915, and 27.25 for 1916.

In the Greeley Arctic Expedition it was not an uncommon occurrence for the men to suffer from complete exhaustion for two or three days after a bowel movement. General Greeley lost one of his best men in


Legend
White Troops
Constipation
Headache
Colored Troops
Constipation
Headache
CHART A.
Chart Showing Prevalence of Constipation, Headache and Neuralgia War of the Rebellion
Monthly Rates per Thousand of Strength White and Colored Troops
Neuralgia
White Troops
Colored Troops
Year ending June 30, 1863
Year ending June 30, 1864
Year ending June 30, 1865
Year ending June 30, 1866
Per Third, Medical Volume, page 674 MEDICAL and SURGICAL HISTORY of the WAR OF THE REBELLION. Surgeon General's Office

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the death of Rice.[11] The effort required to get a bowel easement cost him his life.

"Tied-up" bowels in men in the fighting line is not an uncommon condition. Constipation makes an uncounted number of men non-effectives. Not infrequently men are brought to the operating table needlessly had their bowel-needs been given timely attention and proper treatment. With the Japanese forces in the field, in the Russo-Japanese War, the ratio of constipation to the thousand mean strength was 0.07.[12] Appendicitis is a rare occurrence with Japanese troops. Their troops in the field had a low ratio of noneffectives from disease. At the time of the Boxer Rebellion Japanese soldiers were able to march cheerfully 15 miles to every 10 miles covered by the American troops on the way to Pekin. The medical and sanitary officers of the Japanese Army have proven that the normal condition of the soldier is health, and that those who fall should fall on the firing line and not by the wayside from disease.

In 1917 the mean strength, in enlisted men—American troops, of the U. S. Army—was 639,645.[13] Excluding injuries, venereal diseases, alcoholism and vaccinia there were 480,789 admissions to sick report; and the constantly noneffective totaled 11,832.73, with an in-hospital total of 10,074.43. The ratio per thousand of mean strength of admission to sick report was 751.65; the noneffective ratio was 18.50.

Diseases of the digestive system were the cause of admission to sick report for 56,478 enlisted men (American troops). There were 6,997 admissions with diseases of the stomach (ulcer and cancer excepted); 101 with intestinal obstruction; and 31,470 for other diseases of the intestines;[14] 6,394 enlisted men were admitted for appendicitis, 4,535 for hemorrhoids, and 5,622 for hernia. The ratio per thousand of mean strength for admissions for diseases of the digestive system was 88.30. Including hemorrhoids, 61,013 admissions were for disease of the digestive tract.

The total number of days lost—total noneffectives—for enlisted men admitted to sick report with diseases of the digestive system was 453,840. From diseases of the stomach (ulcer and cancer excepted) 38,188 days were lost, from intestinal obstruction 1,825 days, and from other diseases of the intestines 129,743 days.[14] Appendicitis caused the

[11] Rice died at Cap Isabella in the second attempt to reach a cache of meat.

[12] Medical History of the Russo-Japanese War, Imperial Government. (The writer of this paper made painstaking and diligent search, and persistent inquiry, to find a ratio of constipation in the U. S. Army. Nowhere could he find any data or statistics on this subject, save that to which reference is made in the foot-notes.)

[13] Report of the Surgeon General, U. S. Army, 1918.

[14] Numbers 105, 110, International Classification.

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loss of 119,190 days, hemorrhoids of 43,343 days, and hernia of 113,830 days; 2,145 cases of uncomplicated hemorrhoids went under operation.[15]

Of the 204 causes of admission to sick report from disease, under the International Classification, five were the causes of admission to sick report of 55,018 enlisted men (American troops) of the U. S. Army in the calendar year of 1917. These five causes are diseases of the stomach, other diseases of the intestines, appendicitis, hemorrhoids, and hernia. The total admissions to sick report for all diseases for enlisted men (American troops) in 1917 were 563,644.

It is the duty of the medical officer to know the health condition of every man in his organization. He is both accountable and responsible, on his part, for the up-keep of the command to its highest level of effectiveness—of keeping every man fit and ready to carry the peak load whenever necessity demands it. The duties of the medical force center on protection from disease. Timely measures taken to correct minor disorders of the digestive functions protect the health of the soldiers and prevent the development of the more serious conditions.

With 453,840 days lost[16] to the Army in one year, in 1917, by enlisted men (American troops), from admission to sick report for disease of the digestive system comes a call for inquiry, for wider knowlege as to the causes which underlie this large loss of man-power.

Digestion is a chain of events. It is a complex process, but not, of necessity, a difficult one when there is concurrent physiological action of every part and function. For the process of alimentation to carry through, it is indispensable that the entire alimentary tract should be in a natural working condition. When a condition develops which causes a failure of action in any part of the nutritive functions, when any part of the work of digestion is not being done normally, search should be made for the cause; and an effort should be organized to accomplish its control. The regular evacuation of the body waste is just as important as the feeding of the body. No less pains should be taken to maintain regular, natural habit in one case than in the other. "If a watch loses time because it needs a cleaning, we do not seek a remedy in drugs, but in its cleaning, *better adjustment* and good care." In a word, habitual constipation is an indication of disordered digestion. It is a contributing cause to disease of the digestive system. Not infrequently it is the first step over the threshold into established disease.

It is claimed, by good authority, that the physician who knows when

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[15] In the Texas Militia Mobilization, August, 1917, 370 men, or 2.73 per cent, were reported with hemorrhoids as primary defects; 163 as secondary defects; and 19 men were discharged by reason of these conditions. THE MILITARY SURGEON, July, 1918, p. 60.

[16] Equivalent to 1,243.39 years.

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to employ a cathartic has mastered an important lesson in therapeutics. There is scarcely anything the proper use of which is more important than a real cathartic; the more irritant, the more violent the action, the worse the reaction. "Qui bene purgat, bene curat," is better not taken too seriously. Best is it to take seriously, "Don't expect to cure chronic constipation by drugs." Cathartics are frequently a cause of constipation.[17] Sluggish habits of the bowels are encouraged by laxatives, even by those which have the mildest action. After active catharsis, and particularly when such drastic measures are needless, the violent reaction puts a severe and burdensome tax upon the whole process of alimentation and anabolism. Physiological balance is restored with difficulty. The academic treatment of constipation has been conventionalized. It does not adjust the autonomic system back to the norm. The physiological divisions of the body that have the essential functions of assimilation, conservation, distribution and regulation of the expenditure of energies and the elimination of waste products, work as one autonomic apparatus.[18]

To give routine treatment, and without discrimination, to all cases of constipation alike, treatment which may aggravate or prolong the condition is not the fulfilment of the medical officer's duty. To relieve only for the time being the condition which is the cause of the sick report does not return the man to line of duty as a dependable effective. The handling of constipation in the Army is academic and conventionalized. "C.C." pills and salts are dispensed by army surgeons without consideration for the man or his ailment; they are prescribed for all manner of minor ailments. Here and there is a medical officer who recognizes both the importance of constipation and its proper treatment. Doubtless, knowedge gained through his own personal experiences has brought to him an appreciation of the physiological division of labor in the work of the digestive system, and that time, energy, man-power and expense are not saved when needlessly violent treatment is used.

By no means is it uncommon for the enlisted man to provide himself with his favorite laxative and use it as his body-needs may indicate. He does not use it always with discretion. In the event of his being unable to use his own remedy, oftentimes he will try to pull through his day's work with his discomforts and headache rather than to report his condition. Not always is the man who reports for constipation a slacker. The conscientious man does not care to invite that suspicion. When he can no longer postpone relief, he reports his condition and

[17] Gant, S. G., "Constipation, Obstipation and Intestinal Stasis."
[18] Kempf, E. J., "The Autonomic Functions and the Personality," 1918, p. 3.

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receives regulation treatment; and, not infrequently, he is still ineffective.[19]

"Half the unhappiness in the world proceeds from little stoppages." The man who does not have his natural morning easement begins the day unready, more or less dissatisfied, and, not infrequently, unwilling to carry through his day's work. Many a bad temper is due to this simple fact. His circulation laboring to carry the burden of the toxic load, which a clogged intestinal canal is imposing upon it, brings him headache and malaise; and, oftentimes, he is cold, and has a general feeling of discomfort. In civil life these may not count for much. At any rate he can take his favorite laxative if he so desires. In the Army it counts for a great deal. Human behavior of the soldier is not essentially different from that of the civilian, but it is seen at closer focus. The aggregate of the condition and behavior of each man makes the morale of the organization. Army morale is built up on the tenets of physiology and psychology; it has to start from something. Physical well-being and body-comfort is the genesis of morale. The part that physiology has in morale-making is not a negligible one.

II

There are five outstanding factors which make for better adjustment—better conditioning. These, working together, release the digestive organs from burdens which they cannot carry without bringing disorder into the process and results of nutrition.

In the natural order the first of these is giving sufficient time to the first step in digestion—mastication. One of the strongest arguments against hasty eating is that the stay of the food in the mouth, by stimulating the sense of taste, evokes the secretion of the gastric juice and promotes normal stomach activity. It is common knowledge that all food should be chewed thoroughly; it is an essential mechanical and chemical factor of digestion.

Secondly, water in generous quantity, must be taken into the body every day in order to maintain the physiological balance. It keeps the internal system clean. Maximum health is possible only when all the organs of the body maintain their normal water content—when their water-needs are fully met. Claim for the discovery of water as "the greatest medicine" nature provides has been made by the samurai, the little athletic knights of old Japan. These remarkable men of the jiu-jitsu knew its usefulness and value; they made practical use of

[19] At a sick call a sizable pitcher full of salts, and one glass stood on the surgeon's table. The pitcher was emptied by the men who reported; and each man, who was given salts, in turn drank from the one and unwashed glass.

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their knowledge. In every twenty-four hours they drank a considerable quantity of water which was cool enough to be agreeable to the taste, and pure. The amount of water taken daily by the disciples of jiu-jitsu reaches the gallon mark. Constipation is not common in Japan in civil life or in the army. Whenever a Japanese finds a slight illness coming on, he does not go to a doctor. He eats sparingly and drinks water in generous quantity. A noteworthy fact is that Japanese troops are proof, in all kinds of weather, against rheumatism.[1] They attribute their immunity to this disease to the very free use of water internally and externally. In the Philippines, at the time of the Spanish-American War, pure water freely and persistently drunk for a few days mitigated intestinal disorders. The intestines and every part of the digestive system were benefited greatly. Water is the most important of the inorganic constituents of the body; it is indispensable, without exception, to all the body tissues and fluids. Ninety-nine per cent of the saliva, 80 per cent of the blood, and 75 per cent of the muscles is water. The elasticity, pliability and consistency of the muscles are, to a large extent, conditioned by the amount of water they contain. There are 115 pounds (52.5 kilograms) of water in the body of a man weighing 165 pounds (75 kilograms).[2] A water ration of at least two quarts per man per day is needed to satisfy the ordinary physiologic demands of the body.

Food is the third factor. Nothing touches the soldier's life, at every point, so closely as does the army ration. Beginning with ancient times, great stress has been laid on the effects of different kinds of food; some relaxed, others constipated the bowels; some were more readily digested than others. The United States garrison ration, as laid down by regulations, provides 4,632 calories per man per day. With certain substitutions made to this ration the "modified" garrison ration, so called, provides 4,809 calories. Surveys made in training camps show the average consumption to be a little less than 4,000 calories. On this diet, supplemented by food purchased from camp exchanges, men gained in weight on an average throughout the Army about 9 pounds per man since entering the training camps. Some organizations show an average gain of 20 pounds, others of only 2 or 3 pounds.[3] The

[1] Rheumatism is comparatively unknown among the two younger generations. Only the oldest people are afflicted with it. Even among the aged rheumatism does not occur with sufficient frequency to create dread of it by the grandfathers.

[2] Violent exercise for one hour causes a loss in weight of one-half a pound; two glasses (8 ounces) of water taken restores the lost weight.

[3] Major J. R. Murlin: "Some Problems of Nutrition in the Army." *Science*, Vol. xlvii, No. 1221, May 24, 1918.

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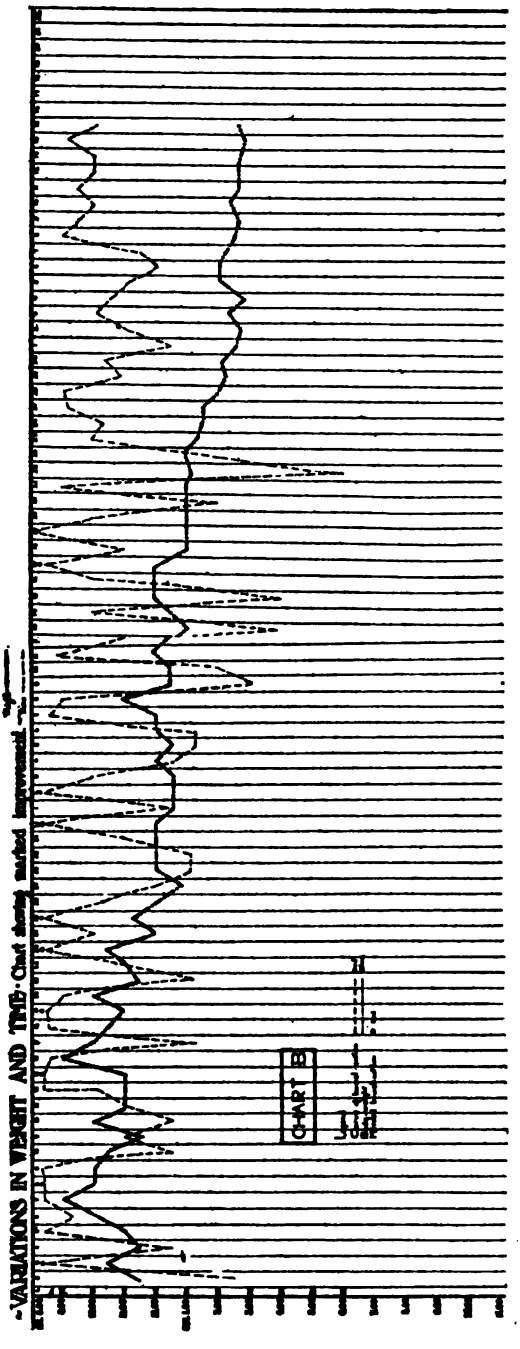

Chart B shows the variations in weight with mixed bowel action. The zero marks (0) at the top of the chart indicate no bowel movement for that day. The dotted broken (- - - -) line indicates the daily weight, showing the gain in weight as the daily bowel action improved. This is the chart of No. 3, Detachment B. This improvement came by habit training; No. 3 had only two laxative tablets.

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average gain, as estimated in four camps, is 7½ pounds in three months.[4] An intensive study of the enlisted men in three army organizations discovered that the men who had chronic constipation registered a loss in weight; and, too, that by reestablishing physiologic colon conditions—natural and regular bowel action—the weight turned to a steady increase.[5]

A ration so thoroughly adjusted to the needs of the Army would lead, it would seem, to more uniform results. It would be interesting to know what relation, if any, influence of station or of arms of service have to the undetermined causation of the wide range in weight gains. Food which is satisfactory in kind and sufficient in quantity is provided in the army ration. Its energy value is sufficient for the maximum measure of work. This is the theoretical requirement of energy necessary to enable a soldier of average weight to march 30 miles in ten hours carrying a pack and other equipment weighing 44 pounds. If a soldier does not do this maximum amount of work, the fuel energy accumulates in his body in the form of fat, and his muscles hypertrophy. Considerable gain in weight is a result.

Closest study is given to the suitability of the ration; to provide mess which makes for effectiveness and satisfactory nutrition, and with reference to the relation of diet to specific muscular energy. Many are the aspects of the problem of nutrition for the Army: the important factor of the relation of diet to disease; variety as a factor of safety in escaping the danger of a lack of some essential to nutritive well-being; and bulk and roughage, their balance and amount. Success or failure of the army ration is registered in the working health and effectiveness of the soldier. The health of the Army is the business conjointly of the nutrition officer and the medical officer.

The fourth factor is exercise. In importance it stands in the front rank with the others. Exercise favors peristalsis. Training and camp life bring to the soldier exercise in plenty, both in kind and intensity. With easier stress the work of drill, marches and action rests upon the man who has quick and enduring energy of body; and the burden of excessive fatigue weighs him down less heavily if he does not fail his morning evacuation.[6]

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[4] Report of the Surgeon General, U. S. Army, 1918.

[5] Part III of this paper is the report (with charts and tables) of this study.

[6] The morning evacuation is considered, in the East, a *sine qua non* of health; and Anglo-Indians are unanimous in their opinion of the "bari-fajar" (as they pronounce the dawn-clearance). The natives of India, Hindu's (pagans) and Hindis (Moslems), unlike Europeans, accustom themselves to evacuate twice a day, evening as well as morning. This may, perhaps, partly account for their mildness and effeminacy, for "C'est la constipation qui rend l'homme rigoureux." The English, since the first invasion of cholera in October, 1831, are a different race from their costive grandparents, who could not dine without a "dinner pill." Curious to say, the clyster is almost unknown to the people of Hindustan, although the barbarous West Africans use it daily to "wash 'um belly," as the Bonnymen say; and, as Sonnini notes, to propose the process in Egypt under the Beys might have cost a Frankish physician his life." (Sir Richard Burton: Arabian Nights, Denver edition, Vol. III, footnote to p. 242.)

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If any single one of these five postulates holds first rank it is this, the fifth, habit. This and the first are, as a rule, within the control of the man himself to regulate. In the Army the other three are subject to regulation other than his own; he has to accept them as they are. Responsibility for their eventuating is not his. But that is not true of habit; the responsibility is wholly his. Habit is an extremely important factor with regard to the fulfilment of every function in digestion. We eat more by habit than by appetite. Practically the times and the amount of eating are chiefly matters of habit. Hunger recurs at the intervals to which we are accustomed. Habit stands in exactly the same relation to the bowel-needs of the body; it is the decisive factor; it is the motivating incentive to bowel easement, easing the load which the surcharged colon cannot carry safely. The state of readiness is a state of neediness. Disregard of the defecatory act through neglect, postponement or repression puts a snub—drag back—on the completion of the process of digestion.[7] The distending stimulus loses its effectiveness, continued absorption of the fluid content harden the feces, and the toxic by-products suffuse the system, causing a recession of energy and endurance, lowering resistance to disease and infection, and delimiting the effectiveness of the soldier and man-power. These toxins are not energic products. Missed and irregular bowel action make low-powered, substandard men.[8]

Why is habit so important a factor in the correction of constipation? It is physiological. Only through its establishment comes certain and regularly working action, and nothing else can be depended upon to secure and maintain permanent results. One should not be content to remain moored to the laxative habit, for as long as drugs are relied upon as substitutes, a natural, autonomic and vital part of the process of digestion fails. "If it were known," said Oliver Wendell Holmes, "that a prize fighter were to have a drastic purgative administered two or three days before a contest, no one will question that it would affect the betting on his side unfavorably."

III

Three organizations in the U. S. Army were under my observation in the working out of a method for determining as exactly as possible their health status in general, and, in particular, to correct and prevent chronic constipation by habit formation. New-time methods and instruments of warfare demand that the soldiery should be in the

[7] The feeling that one must defecate but cannot, shows distress and inability to become interested in anything else.

[8] This statement bears repeating. "Fear God, and keep your bowels open," is the earnest exhortation of a well-known physiologist.

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primest of physical condition. Men who are well conditioned stand up the best against every hazard; they succumb to war shock rarely; they do not break down physically and mentally from the stress of forced and intensive training in camps and cantonments. They are dependable on every occasion and for all demands; they are not the noneffectives. In hasty mobilization it is impossible to reject, or cull out from the aggregate, large numbers of men belonging to the type with neurotic or psychopathic constitutions. These men, and *many others*, become more or less constant noneffectives, and a burden and expense to the Army, unless they can be saved to the service.

A method to be usable must be practical, simple and time-saving both in its operation and results. The pressure of training leaves no unused time; its demands require practically all the time there is. By which token the method must fit into the organized plan, and it must be carried through without making too great demands upon the medical officer of the organization. Besides, it must bring satisfactory results.

First, I find out the men in the organization who are habitually constipated, and how long they have been in that condition. This quest discovers to the medical officer much other information which is useful, facts which may be advantageous mutually, both to himself and to the men. To the group of men who need habit training the method is explained simply and precisely; and to each man is given, in an envelope, a card[1] on which he is to record every day the exact time of his bowel movement. Missed bowel action is recorded with a zero mark. Both the envelope and the card carry the enlisted man's

No.	Name								Date						
Hour															
Weight															
Hour															
Weight															
Hour															
Weight															
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[1] Card for 8 weeks record. Hour indicates the time of the day at which the bowels move. The body weight should be taken at the *same time* every day.

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name, and the number assigned him. Included in the envelope are brief printed instructions.

A brief, simply stated and definitive talk on the five outstanding factors, which make for better conditioning, supplements the explanation of the method for habit training. Training begins at once. In no event is a man to take a laxative. In fact, he is not to take medicine of any kind. Every time he fails to have a daily easement he reports to me, and if I think he needs it I give him a laxative. But in no case does a man get a laxative when he is not in absolute need of it. If the cause of his failure rests with him, I refuse to give him medicine, so as to give point to the fact that the success of any undertaking to secure for him relief depends upon his conscientious coöperation and personal effort. The man with whom there is a natural order of events reports to me at stated times for the checking up of his record.

There is a choice to be made in the laxative used in habit training. A violent cathartic of the "bludgeon" or "dynamite pill" type would, undoubtedly, fail to secure the best results. The compound cathartic pill is of varying resistance to solution and disintegration. With the solubility test it is sometimes twenty-four hours before these pills are dissolved. Salts merely increase the fluid bulk of the bowel contents without having much effect on peristalsis. Cascara sagrada stimulates peristalsis, and the fluid extract could be used with success, without doubt. In the Army spastic constipation is not uncommon, and as a result of stress, worry or excessive fatigue. For this condition violent and depleting cathartics, with their drastic purging, are undesirable remedies.

The laxative used with the A and B detachments was a tablet containing hyoscyamus. In the solubility test this tablet dissolves completely in twenty minutes in water at body temperature. For many years hyoscyamus has been known to modify the effect of a cathartic, and to be preferable to belladonna. One tablet was effective; it was always "twice alike," as free as possible from griping, not excessive in action, and with no disagreeable side effects. Without exception this laxative worked satisfactorily. It brought the desired result comfortably, and complete and easy relief came in about ten hours after being taken. It did not take the man from his duties. Occasionally two tablets may be required for men of certain habit, and whose bowel condition is obstinately chronic.

Immediately habit training begins, the men seek the latrine at a regular, stated time.[2] After a few trials a responsive state of readiness

[2] The bowels are more readily emptied after meals, and preferably after the morning meal. With sufficient accumulation of the solid material at the sigmoid flexure, strong peristaltic contractions move the mass on into the rectum, and this gives the desire to empty the bowels.

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comes, and the bowel-need is satisfied without straining, or strongly forced effort, and in brief time. No anxiety or discomfort is carried through the day. When the habit is established much time is saved, and in many ways. Many, if not most, of the men in the organizations which came under my close observation had never had any definitive instructions upon the personal equation in relation to their bowel-needs. They knew little or nothing about natural habit. All of them knew the laxative habit. With but few exceptions the men in the three organizations straightway took keen interest in the undertaking and gave to it ready and unstinted coöperation. This method proved, in practice, that is it an aid to the medical officer in the health upkeep of the enlisted men, and that it reinforces the effectiveness and morale of the organization.

Detachment A

This organization began habit training on June 28, 1918. On that date there were 150 enlisted men enrolled. Seventy-one of these men, 47.33 per cent, were habitually constipated. This condition had existed from one to twelve and more years. The average duration was four years. Fifty-seven men were enrolled in the training group, fourteen of them having received transfer orders.

Summation of Condition and Progress

Number	*Years constipated*	*Result of training*
1	Always.....	September 25, 1918. No medicine taken. "Bowels now regular."
2	3 years.....	August 14, 1918. No medicine taken. "Thinks of it every morning, and goes." Transferred to A. E. F.
3	2 years	September 25, 1918. No medicine taken. Improved.
4	1 year	August 14, 1918. No medicine taken. Improved. Transferred to A. E. F.
5	2 years.....	August 10, 1918. No medicine taken. "More regular than at any time in the past five years."
6	6 years.....	Constant noneffective; no desire to try for improvement.
7	4 years.....	August 27, 1918. Satisfied with his condition. "No better."
8	2 years.....	August 14, 1918. No medicine taken. Transferred to A. E. F. September 2, 1918 (by letter): "My bowels move regularly every morning; and I think I can keep the habit."

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Number	*Years constipated*	*Result of training*
9	2 years	August 14, 1918. No medicine taken. Improved. Transferred.
10	6 years	August 14, 1918. Medicine 3 times: July 2, 8, 28. "Bowels regular now; they never used to be. Sometimes I went one week without a movement." Transferred to A. E. F.
11	6 years	August 27, 1918. Medicine once: July 1. "Bowels are more regular now; they move every morning. I feel whole lots better. It was well worth while."
12	3 years	September 2, 1918. No medicine taken. Regular bowel action. Gained in weight.
13	3 years	August 14, 1918. Medicine once: July 2. "At 8 every morning a good bowel action, which I did not have before." Transferred to A. E. F.
14	5 years	August 14, 1918. Medicine 3 times; July 15, Aug. 5, 9. Regular action every morning, which he never had before. Transferred to A. E. F.
15	7 years	An illiterate; mentally deficient.
16	3 years	August 14, 1918. Medicine twice: July 11, 16. Improvement. Transferred to A. E. F.
17	5 years	August 27, 1918. No medicine taken. Improvement.
18	3 years	August 14, 1918. No medicine taken. "The first thing I think of in the morning." Transferred to A. E. F.
19	3 years	No desire to improve his condition.
20	3 years	August 27, 1918. No medicine taken. Improvement.
21	10 years	August 13, 1918. Medicine twice: July 14, Aug. 11. "A fellow can move his bowels if he wants to; he can make it a habit."
22	3 years	August 27, 1918. Medicine once: July 31. Improvement.
23	4 years	August 27, 1918. Medicine once: July 3. Incomplete record. Limited improvement.
24	12 years	September 17, 1918. No medicine taken. Improvement. Gained in weight.
25	2 years	August 27, 1918. No medicine taken. Improvement.
26	6 years	August 27, 1918. No medicine taken. Improvement.

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Number	*Years constipated*	*Result of training*
27	1 year	July 17, 1918. Admitted to hospital; venereal disease. Laxative 3 times before admission.
28	3 years	August 27, 1918. No medicine given. Limited improvement.
29	5 years	October 30, 1918. Medicine 5 times: July 5, 13, 20, Aug. 5, 7. Admitted to hospital; appendicitis. Operation.
30	4 years	September 24, 1918. No medicine taken. Improvement. "No headaches now. Bowels move every morning. Habit is better than medicine. It did me lots of good."
31	Always	August 27, 1918. Manifested no desire to try bettering his condition.
32	4 years	August 27, 1918. Medicine 8 times: July 5, 10, 16, 25, 31; Aug. 9, 11, 19. Pyorrhea alveolaris. "Sorry teeth; no better."
33	1 year	August 14, 1918. Medicine once: July 29. "I feel better every way." Transferred to A. E. F.
34	4 years	August 27, 1918. No medicine taken. Improvement.
35	6 years	August 27, 1918. No medicine taken. Improvement.
36	5 years	August 27, 1918. Medicine 6 times: July 20, 26; Aug. 2, 7, 14, 16. Improvement.
37	6 years	September 25, 1918. No medicine taken. Improvement. Steady gain in weight.
38	2 years	August 27, 1918. Condition unchanged. An illiterate.
39	6 years	This man kept no record.
40	5 years	September 15, 1918. Medicine 3 times: July 5, 13, 18. On July 23 reported a loss in weight of 17½ lbs. in past 10 weeks. Bismuth gastro-intestinal X-ray taken; admitted to hospital; operation for appendicitis. In 1910 operated on for hernia; in 1915 for hemorrhoids.
41	3 years	September 25, 1918. No medicine taken. "I have no headaches now; my bowels act regularly. I have never taken anything since I started (June 28). It is well worth while." Steady gain in weight.

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Number	*Years constipated*	*Result of training*
42	8 years	August 27, 1918. No medicine taken. Improvement.
43	2 years	Transferred.
44	3 years	Transferred.
45	3 years	August 27, 1918. No medicine taken. Limited improvement.
46	3 years	August 27, 1918. Medicine 3 times: July 16, 19, 23. "Feel lot better; did me a lot of good."
47	7 years	August 27, 1918. No medicine taken. Improvement.
48	4 years	August 14, 1918. Medicine once: July 8. Improvement. Transferred to A. E. F.
49	3 years	Satisfied with his condition.
50	3 years	August 27, 1918. Medicine once: July 8. "I never have any more trouble; every day I think of it, and go regularly. I am cured. I used to like physic, but habit is better."
51	7 years	Transferred. Sick in quarters and hospital often.
52	4 years	August 14, 1918. Medicine twice: July 15, 22. Began habit training July 15: bowels were in bad condition, having been eight days with only three movements. Reports much improvement. Needs dental attention. Transferred to A. E. F.
53	2 years	August 27, 1918. Medicine once: July 16. Improvement.
54	4 years	August 14, 1918. Medicine once: July 23. Began habit training July 15. "Now when I get up I *want* to go for my movement." Transferred to A. E. F.
55	4 years	July 24, 1918. No medicine taken. Began habit plan July 11. "I had been buying bowel medicine. Now I am doing well."
	3 years	August 27, 1918. Medicine twice: July 26, 31. Began habit plan July 18. Improvement. September 25: "Bowels all right."
57	4 years	September 25, 1918. Medicine twice: July 25, Aug. 8. Improvement.

The absolute number of men who carried through the training was forty-seven, ten men having been taken from the group by transfer, or

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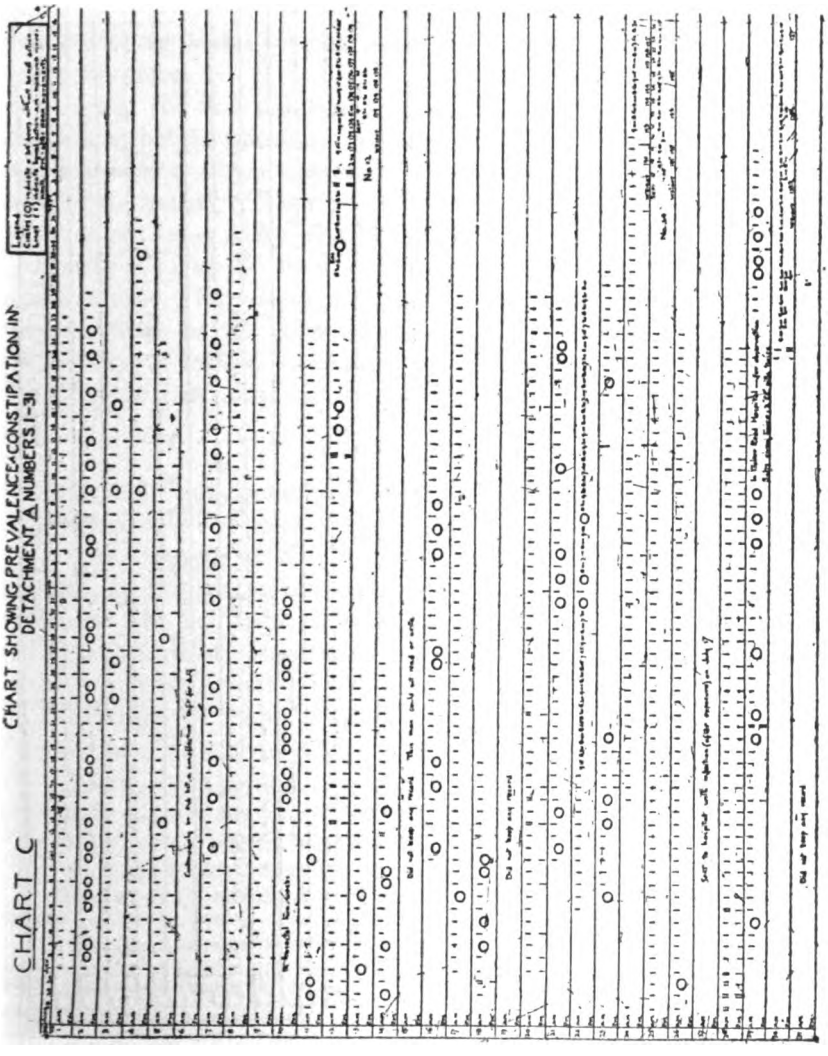
for cause as stated in the summation. From June 28 to September 1, 1918, twenty-four of these men had no laxative; they had no medicine of any kind. Twenty-three of the men took a laxative:

No. 6 had 1 tablet.
No. 10 had 3 tablets.
No. 11 had 1 tablet.
No. 13 had 1 tablet.
No. 14 had 3 tablets.
No. 16 had 2 tablets.
No. 21 had 2 tablets.
No. 22 had castor oil once.
No. 23 had 1 tablet.
No. 27 had 3 tablets.
No. 29 had 5 tablets.
No. 32 had 8 tablets.
No. 33 had 1 tablet.
No. 36 had 4 tablets and 2 half tablets.



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No. 40 had 3 tablets.
No. 46 had 3 tablets.
No. 48 had 1 tablet.
No. 50 had 1 tablet.
No. 52 had 2 tablets.
No. 53 had 1 tablet.
No. 54 had 1 tablet.
No. 56 had 2 tablets
No. 57 had 2 tablets.

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During this period of two months a laxative was given fifty-four times. The mean strength, in enlisted men, of this command was 150. Markedly improved bowel condition, and a distinct and acknowledged gain in general health came to 39, or 82.97 per cent of the men. Of these men 22, or 56.41 per cent had no laxative. Limited improvement was made by 5 men. There was no record for 3 men; they were transferred. No gain was made with 10 men. These were Numbers 6, 7, 15, 19, 29, 31, 32, 38, 40, 49.

The food of this organization was generally poor, and frequently very poor. It failed in quantity, quality and variety; and bulk or roughage did not figure in the enlisted men's mess. Very many of the men needed dental attention, and badly. Colonel Logan, Chief of the Dental Division of the U. S. Army, assigned Major Mitchell to the organization as dental surgeon, and the much-needed dental work was thoroughly done.

This was the first practical test of my method for correcting constipation by habit-formation. It was new work; and it was tried out on the organization which was ready at hand.[3] Gratifying results were brought to record. There was distinct gain in the general health-condition of the organization, and the morale advanced to a higher level.

Charts C and D show the prevalence of constipation in this organization. They also show the daily condition and record of the men who were in the habit training group. The zero marks point out the days of missed bowel action. These seen in the aggregate give a clearer idea of the sum-total of this condition in the organization.

DETACHMENT B

Habit training began on July 24, 1918, with Detachment B. It was undertaken at the request of the commanding officer of the organization. The strength of the command, in enlisted men, at that time was 62. In the preliminary survey 47 men, or 75.80 per cent, were discovered who had habitual constipation. All the new men assigned to this unit for duty reported to me, the medical officer. Those who needed better conditioning were straightway taken in hand.

Thirty-three of the 47 men had no laxative; they had no medicine. Fourteen men were given a laxative:

No. 2 had 3½ tablets, July 24, 26, 29, each one; July 31, one-half.
No. 3 had 2 tablets, July 25, 29, each one.
No. 4 had 1½ tablets, July 24, one; August 6, one-half.
No. 8 had 1 tablet, August 1, one.
No. 19 had 1½ tablets, July 24, one; 27, castor oil; August 22, one-half.

[3] I wish to express my appreciation of Col. Pearce Bailey's open-minded interest in this work; and also my appreciation of the opportunity, which he created, of making a practical test of the method. I also acknowledge the hearty and responsive coöperation given this work by its many friends, both officers and men.

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No. 20 had 1 tablet, July 29, one.
No. 22 had 5½ tablets, July 25, 29, 31, August 1, each one; August 6, 14, each one-half.
No. 23 had 1 tablet, August 6, one.
No. 26 had 1 tablet, July 25, one.
No. 29 had 3½ tablets, July 25, 29, 31, each one; August 2, one-half.
No. 30, had 1 tablet, July 24, one.
No. 34 had 1 tablet, July 25, one.
No. 35 had 1 tablet, August 6, one.
No. 36 had ½ tablet, August 22, one-half.
A laxative was given twenty-six times.

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Charts E and F show the prevalence of constipation in Detachment B. On these charts the exact time of the bowel movement is recorded. Zero marks indicate missed bowel action. The daily weight is also recorded. These weights were taken at the same time every day, and on the same scales.

With Detachment A there were indications that, along with the

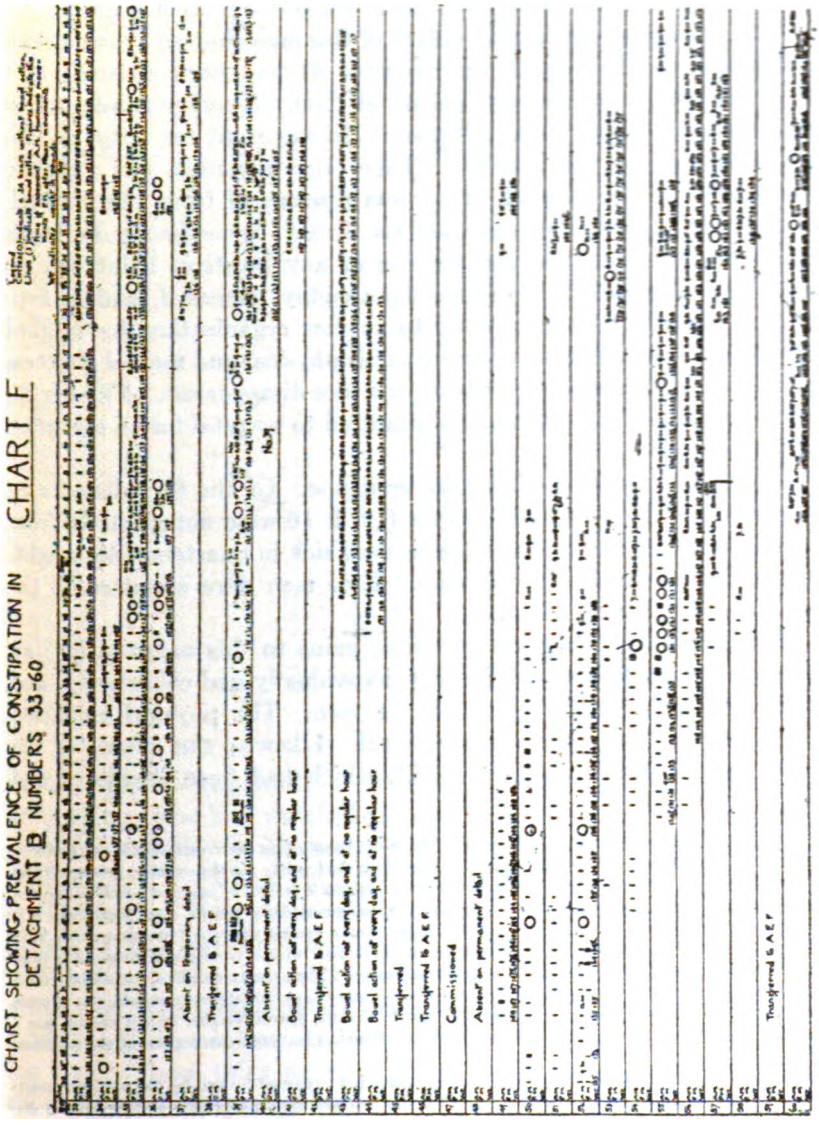
CHART SHOWING PREVALENCE OF CONSTIPATION IN DETACHMENT B NUMBERS 33-60
CHART F
Absent on frequent detail
Transferred to A E F
Bowel action not every day, and at no regular hour
Absent on permanent detail
Transferred
Commissioned

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improvement of the bowel function, came a stabilization and gain in the body weight. In Detachment B this lead was followed up. Army regulation of clothing eliminates one inconstant factor (variability in the weight of clothes) in tabulating a series of weights. Such a series loses its intrinsic value if the weight is not taken at the same hour every day.[4] All the factors for reliability were strictly observed in this weight series. The results obtained added corroborative evidence.

The sick report for August (1918) of this organization shows a clean health record. Private D and Number 61 had been constant non-effectives over a considerable period of time. Number 9 was sick in quarters when habit training began. He was unfit for duty, and he was admitted to the hospital. There the diagnosis was "chronic constipation." On August 12 he was discharged from the hospital, and sent back to his organization for duty.[5] Immediately he began habit training, and, without the use of any laxative, habit was established. His weight (148 pounds) steadily increased, and in September, when he was transferred to another organization, he weighed 156 pounds. A noticeable increase in his physical and mental alertness appeared, and the acne on his body and face disappeared. Number 23, in the September sick report, was admitted to hospital for an operation for hernia.

In October came the influenza epidemic. Of the 62 enlisted men who were in Detachment B in July (1918) 16 were noneffectives from the epidemic. Twelve of these men were sick in quarters with a light, uncomplicated form of the disease. Four men were admitted to the hospital—Numbers 7, 34, 41, 49.

Habit training brought two visible gains to this organization; an advance in the efficiency of the unit, individually and collectively; and an improvement in the spirit of the men. The physical condition of the command reached a higher level. Likewise the morale of the organization moved upwards. Drill, which had been desultory and

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[4] There is a daily swing in the body-weight. The mean twenty-four hour variation is two and one-half (2½) pounds. At noon, between 12 and 1, the weight is the lowest. In the evening, between 6 and 7, it is the highest. With breakfast taken, there is an increase in weight of one and a half to one and three-quarter pounds; this weight comes nearest the maximum daily weight, and sometimes it is the maximum. In a weight series of a normal, healthy man carried through 100 consecutive days the after-breakfast weight was the maximum twenty-four hour weight twenty-two times; five times both the 8 a. m. and the evening weights were the maximum. The evening weight alone was the maximum sixty-six times. On these same one hundred consecutive days the minimum weight was at noon, 12-1, seventy-five times. The only other hour which had the lowest weight, except rarely, was 7 a. m., with seven times in one hundred days. Six times both 7 a. m. and noon registered the minimum daily weight.

[5] Number 9 (Chart E, Detachment B). He was discharged "relieved"—and by the academic treatment. His record as charted (note the zeros) for the fourteen days immediately following his discharge shows his condition. He is a constitutional psychopath.

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DETACHMENT B

SICK REPORT FOR SIX MONTHS, JUNE, 1918, TO JANUARY, 1919

Strength of command	Hospital, days	Quarters, days	Strength of command	Hospital, days	Quarters, days
62 Men			October—*Contin'd*		
July:			No. 17		9
Private L		3	No. 62		14
Private D	31		No. 54		1
No. 61	10		No. 55		18
No. 9		6	No. 11		8
			No. 5		20
67 Men			No. 70		7
August:			Private M 1		3
Private D	24		Private S		4
No. 61	20				
No. 9	12		*74 Men*		
			November:		
65 Men			No. 7	30	
September:			No. 49	2	
No. 53		2	No. 26		30
No. 23	10		No. 34	13	
No. 54		1	No. 19		4
No. 11		1	No. 21		15
			Private M 1		1
66 Men					
October:			*77 Men*		
No. 7	24		December:		
No. 49		6	No. 7	21	
No. 49	18		No. 62		2
No. 53		18	No. 26		15
No. 34		3	No. 21		15
No. 34	11		No. 39		2
No. 13		2	No. 24	6	
No. 23	31		No. 54	5	
No. 8		8	No. 54		5
No. 19		18	No. 70	8	
No. 21		7	No. 55		26
No. 44		3	Private M 2	6	
No. 41		13	Private W		2
No. 41	9				

slow, sometimes hopelessly so, took on new animation and life. An army officer, who had watched the men of this unit in their daily drill, remarked, one day in August, "They were the worst drilling squad in Washington. Now they drill like West Pointers."

The food of this organization was generally satisfactory. All the officers of the command coöperated heartily and fully to order the contributing factors for good conditioning. Many of the men needed dental care, and arrangements were made whereby these needs could be fulfilled. Twelve-minute talks, by well-known specialists, were given the men. These talks were upon important parts of the body, and the men were instructed how not to trespass upon insecure health.

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Worth-while results are gained through simply stated, meaty and definitive talks on the care of the feet, mouth, eyes and body needs. These talks can be brief. They need take no time out of the soldier's working hours. They bring down the noneffective ratio.

DETACHMENT D

The commanding officer of this organization, the Surgeon General's Office Detachment, requested habit-formation training for his men. Training began on September 18, 1918. At that time the strength of the command, in enlisted men, was 108. Chronic constipation was discovered in 75.50 per cent of these men.

An added feature, and used for the first time, was the Service Score Card. This record card was used for two reasons: First, to have a more complete individual record for reference, and an uniform method for physical ratings; second, to provide a joint record and rating by which both the medical officer and the line officer could measure the results of the training.

SERVICE SCORE CARD

Organization: Date: Series:
Name: Age: Wt. Ht. No.
Rank: Type:

1. Eyes:
2. Ears:
3. Teeth:
4. Chewing:
5. Stomach:
6. Bowels:
7. Skin:
8. Feet:
9. Headache:
10. Heart:
11. Deviations from normal:
12. Sick call:
13. Hospital:
14. Intelligence:
15. Psychological tests:

Remarks:

16. Military bearing:
17. Response to commands:
18. Weakness:
19. Personal qualities:

General value:

Each of the 20 numbers is rated on a basis of 5, with 1 for the lowest, and 5 for the highest.

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Twenty rating items are on this card, each item rated on a basis of 5, with 1 for the lowest, and 5 for the highest. The medical officer rates the man on the first fifteen items—those in the left-hand column. On the last five—16, 17, 18, 19, 20—the line officer rates the man. The entire twenty items, in the aggregate, rate on a scale of 100 points. Under Psychological Tests (15) the rating of the psychological officer is recorded. Under Type is recorded the type of the man according as he belongs to the carnivorous or herbivorous group.[6] The man and the job: will they fit each other? How is one to tell? The expert generally knows at a glance; his judgment is based on experience. Type provides another key, should experience be scanty.

Schooling	No. of years	Graduated		Age at end	Principal civil occupation:	
		Yes	No			
(a) Lower.....					Years engaged in it:	
(b) High.....					Birthplace:	
(c) College....					Married:	Children:
(d) Night.....					Enlisted:	Drafted:
(e) Trade or Business...					Home Address:	
(f) Technical or Professional					State: No.:	City: Street:

RATING

Physical	Intelligence	Personal qualities	Gen. value	Improvement	Total	Date

Time under observation: Signed by , Rating Officer.

Time under observation: Signed by , Rating Officer.

Improvement is included under rating on the back of the card. Provision is also made for separate ratings by the medical officer and the line officer.

Another new feature, which was introduced with the Detachment

[6] Sometimes called "narrow-backs" and "broad-backs," respectively. John Bryant, M.D., Boston *Medical and Surgical Journal*, 1915, clxxii, p. 321, and clxxiii, p. 384. Joel E. Goldthwait, M.D., Boston *Medical and Surgical Journal*, 1915, clxxii, p. 881.

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DETACHMENT D

CHART SHOWING THE PRINCIPAL PHYSICAL DEFECTS, ENLISTED MEN, NOS. 1-50, SEPTEMBER, 1918

No.	Eyes	Ears	Teeth	Mastication	Stomach	Defecation	Skin	Feet	Sick report	Hospital
1	—	—	—	3	—	—	4	—	4	—
2	—	—	—	—	—	4	—	—	—	—
3	3	—	—	3	—	2	—	—	—	—
4	—	—	—	3	—	—	4	—	—	—
5	—	—	—	3	4	4	—	—	—	—
6	—	—	—	3	—	3	4	—	—	—
7	—	—	—	3	—	—	4	—	—	—
8	—	—	—	3	4	2	—	—	—	—
9	—	—	—	—	—	4	—	—	—	—
10	—	—	—	4	3	2	4	—	—	—
11	—	—	—	3	3	2	4	—	4	—
12	4	—	4	2	3	2	4	—	4	3
13	3	—	4	3	4	3	3	—	—	—
14	—	3	—	—	—	4	4	—	—	—
15	—	—	1	2	2	2	2	—	—	—
16	3	—	4	3	—	4	4	4	—	—
17	4	—	3	3	—	4	4	4	—	—
18	—	—	4	3	—	—	—	—	—	3
19	4	—	3	3	—	—	—	4	—	—
20	4	—	4	3	—	4	—	4	—	—
21	4	—	4	3	—	—	3	—	—	—
22	—	—	3	3	3	3	—	3	—	2
23	—	—	4	3	4	4	4	4	—	—
24	3	—	3	4	—	—	3	3	—	—
25	3	—	3	3	3	3	4	3	4	1
26	4	4	—	—	—	3	4	4	—	—
27	—	—	—	3	3	3	—	4	—	1
28	—	—	4	—	—	—	4	3	—	—
29	—	—	—	3	4	4	3	4	—	—
30	3	—	4	3	—	—	2	—	—	—
31	—	—	—	4	4	3	3	3	4	—
32	3	—	4	3	3	1	2	3	4	—
33	4	—	—	4	—	2	3	3	—	—
34	4	—	4	3	—	—	3	3	—	—
35	3	—	4	3	—	4	4	—	—	—
36	—	—	4	3	—	—	4	4	—	—
37	3	—	3	4	4	1	4	3	—	—
38	3	—	4	—	—	—	4	3	—	—
39	3	—	1	2	3	3	3	4	—	—
40	3	—	4	4	—	—	—	4	—	—
41	—	—	3	4	—	4	3	4	—	—
42	—	—	3	—	—	—	4	4	—	—
43	4	—	4	4	—	3	4	3	—	3
44	3	3	4	—	—	3	3	3	—	—
45	3	—	3	3	—	3	4	4	—	—
46	4	—	3	4	3	3	—	4	—	2
47	—	—	3	4	—	3	4	4	—	1
48	—	—	4	3	4	3	3	3	—	—
49	—	2	4	4	—	3	3	—	—	—
50	—	—	3	3	2	3	2	—	—	—

CHART G

Rating for each item is on a basis of 5, with 1 as the lowest, and 5 as the highest. The spaces with a line — indicate a rating of 5 for that item.

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D, was the use of bran as a laxative. This change was made so as to test its merits. The daily weight of the men of this organization was recorded. Food and living conditions of Detachments B and D, were identically the same. Complete records of 86 enlisted men were assembled on Service Score Cards, and these men were given ratings. Charts G and H show the principal physical deficiences, as worked out from the records, and also the ratings on these defects.

DETACHMENT D

CHART SHOWING THE PRINCIPAL PHYSICAL DEFECTS, ENLISTED MEN, NOS. 51–86, SEPTEMBER, 1918

No.	Eyes	Ears	Teeth	Mastication	Stomach	Defecation	Skin	Feet	Sick report	Hospital
51	2	—	4	3	—	—	3	3	4	—
52	—	—	2	2	4	—	3	4	—	—
53	3	—	2	3	3	3	3	3	—	—
54	3	—	3	3	—	—	3	3	4	—
55	3	—	3	4	—	—	4	3	—	—
56	3	—	—	3	—	3	4	—	—	3
57	—	—	2	2	3	2	3	4	4	—
58	3	—	4	4	—	—	4	—	—	—
59	3	—	—	3	—	4	2	3	—	—
60	3	—	3	3	4	4	3	4	—	—
61	—	3	—	3	—	3	3	3	3	—
62	—	3	3	3	—	4	4	4	—	—
63	3	3	4	—	4	4	3	3	—	—
64	4	—	4	3	—	—	3	3	—	—
65	—	—	3	4	—	4	3	4	—	4
66	—	—	4	4	—	4	2	4	—	—
67	—	3	—	—	3	4	4	4	—	—
68	—	2	3	3	2	4	—	3	—	—
69	4	—	3	—	—	3	4	4	—	—
70	3	—	3	3	—	—	3	3	—	—
71	3	—	2	4	2	2	3	3	2	2
72	—	—	—	3	3	2	3	3	—	—
73	4	—	4	4	—	4	4	3	—	—
74	—	—	4	4	3	2	4	3	—	—
75	3	—	3	4	—	2	3	4	4	—
76	3	—	4	3	—	3	4	4	—	—
77	4	—	2	—	1	4	2	—	—	—
78	3	—	—	4	—	4	4	3	3	—
79	—	—	—	3	3	2	2	3	2	3
80	—	—	4	3	3	2	2	—	—	—
81	3	—	4	4	4	1	3	—	—	—
82	—	—	3	2	2	2	4	4	3	—
83	—	—	3	3	—	3	4	3	2	3
84	—	—	—	4	—	3	2	3	—	3
85	—	—	3	3	—	4	—	3	—	3
86	4	—	—	3	—	1	3	4	3	3

CHART H

Rating for each item is on a basis of *5*, with 1 as the lowest and *5* as the highest. The spaces with a line — indicate a rating of *5* for that item.

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An interesting and noteworthy feature, which grew out of the work with this organization, and likewise with Detachment B, was the genuine interest and coöperation of the men in the undertaking. Training of Detachment D was quickly organized, and directly it was well under way, emergency orders came for me to report immediately to Camp Meade for duty in the influenza epidemic. During my absence of a month these men carried on the training, and on my return a hundred and more of the men met me with their daily records faithfully recorded on their cards. This fact is interesting in that it tells, with no uncertain emphasis, the genuine appreciation the enlisted men have for good-conditioning. With better conditioning came good care, upon their own part, of the men themselves. Again, an emergency order sent me to another camp. The men continued with their training and

DETACHMENT D

MEN ON SICK REPORT DURING THE PERIOD, SEPTEMBER 16 TO DECEMBER 1, 1918

Strength of command	Hospital, days	Quarters, days	Duty, days	Strength of command	Hospital, days	Quarters, days	Duty, days
108 *men*				October—*Con.*			
September:				No. 69			6
No. 16			3	No. 68			1
No. 54			1	No. 71			2
No. 61			1	No. 46			4
No. 51		2		No. 40			2
No. 78			3	No. 64		1	
No. 75			1	No. 82			1
No. 7			1	Private G1			1
No. 8			1	Private G2			1
No. 63			1	Private H		1	
No. 11		1	3	Private P			1
No. 1		1		Private T			1
No. 13			2				
No. 57			2	119 *men*			
No. 69			7	November:			
No. 68			2	No. 16			2
No. 71	6			No. 54			1
Private K	7			No. 78		1	3
Private L	15			No. 62			1
Private M			1	No. 55			1
				No. 7			4
111 *men*				No. 1		1	1
October:				No. 69			10
No. 2			2	No. 12			1
No. 73		1	1	No. 74			3
No. 56		1	1	No. 80			1
No. 43			2	No. 39			3
No. 48			1	No. 71			1
No. 42			2	No. 81			3
No. 16			1	No. 82			1
No. 17			1	No. 25			1
No. 61			2	No. 52			1
No. 29			1	No. 64			1
No. 51			1	No. 56			1
No. 78		1	1	Private F			1
No. 62		1		Private G			1
No. 83			1	Private H			3
No. 7			2	Private K			2
No. 15		2	3	Private M1		1	
No. 8			1	Private M2			1
No. 11			2	Private M3			1
No. 66			2	Private P		1	
No. 86		1		Private T			1

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daily records. While I was on duty in camp the armistice came, and my active service ended.

With the sudden ending of this work came regrets. A re-rating of Detachment D, as planned with the service card, would have shown interesting results. The only authentic record of the physical condition of this organization, after the training period, is the sick report.

This report is for the months of the influenza epidemic, and it shows that the total number of days lost from sickness for the months of October and November was relatively small. It would be of interest to know exactly what part, if any, the better conditioning of the men had in protection against disease. At Camp Meade, in October, in a convalescent ward of Evacuation Hospital No. 38, of 75 men who had been admitted to the base hospital for broncho-pneumonia following influenza, a large number were chronically constipated; and 26 per cent had that condition habitually, in obstinate form.

CONCLUSION

Constipation is a functional disorder. It can be corrected; it is preventable. A two-fold benefit comes through health-constructive work; existing conditions of imperfect health are corrected; and, perforce, foundation is laid for their prevention. There are certain events in the daily life of the soldier which, in their observance or in the breach, have a part in determining his well-being. In helping him to discover these "key points," and profit by their observance, a common service is done the man and his organization—and the Army.

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SPUTUM-BORNE DISEASE TRANSMISSION WITH EPIDEMIOLOGIC AND BACTERIOLOGIC RESEARCH

By Lieut. Colonel JAMES G. CUMMING
Medical Corps, United States Army

(With five illustrations)

OF THE camps at the Port of Embarkation, Newport News, Va., Camp Alexander was unique in that, over a considerable period of time, there was an opportunity to make a comparative study of the influence of eating utensil sanitation on the incidence of the sputum-borne diseases. In the early days of the port the camp consisted of draftees from nearby sections of the country, but later it became an important mobilization and embarkation camp for colored stevedore and labor organizations recruited at the southern camps. As the number of colored troops arriving at the port increased (a comparatively high percentage were, owing to disabilities—chief of which was venereal infection—found unfit for overseas service), it became necessary to segregate the unfit into units.

Reserve Labor Battalions.—These unfit units were designated reserve labor battalions. All the men composing these battalions were given appropriate medical treatment. Some were cured and rendered fit for overseas service, others were fit for home service only, while a third class was discharged. These reserve battalions accomplished the necessary labor at the port. Their strength varied within narrow limits, because the discharges were equalized by transfers from other organizations. As nearly as could be determined there was a "turn over" in the personnel of the reserve labor battalions every eight weeks. Some men remained under treatment or observation for a longer period, others for a shorter period, but the average stay in the organization for each man was approximately eight weeks. The mean strength of the reserve organizations for the period of the investigation (ten months) was 3,115.

Stevedore Regiments.—In addition to the reserve labor battalions there were also in this camp stevedore regiments. In contrast to the reserve organizations these stevedore units were made up entirely of men physically fit for overseas service. They were recruited at the southern camps and had already received some training before they were mobilized into overseas regiments at the port. Each stevedore regiment remained at the port approximately five weeks and received further preparation and outfitting for overseas service. The mean strength of these stevedore organizations for the period of the investigation was 2,856 men.

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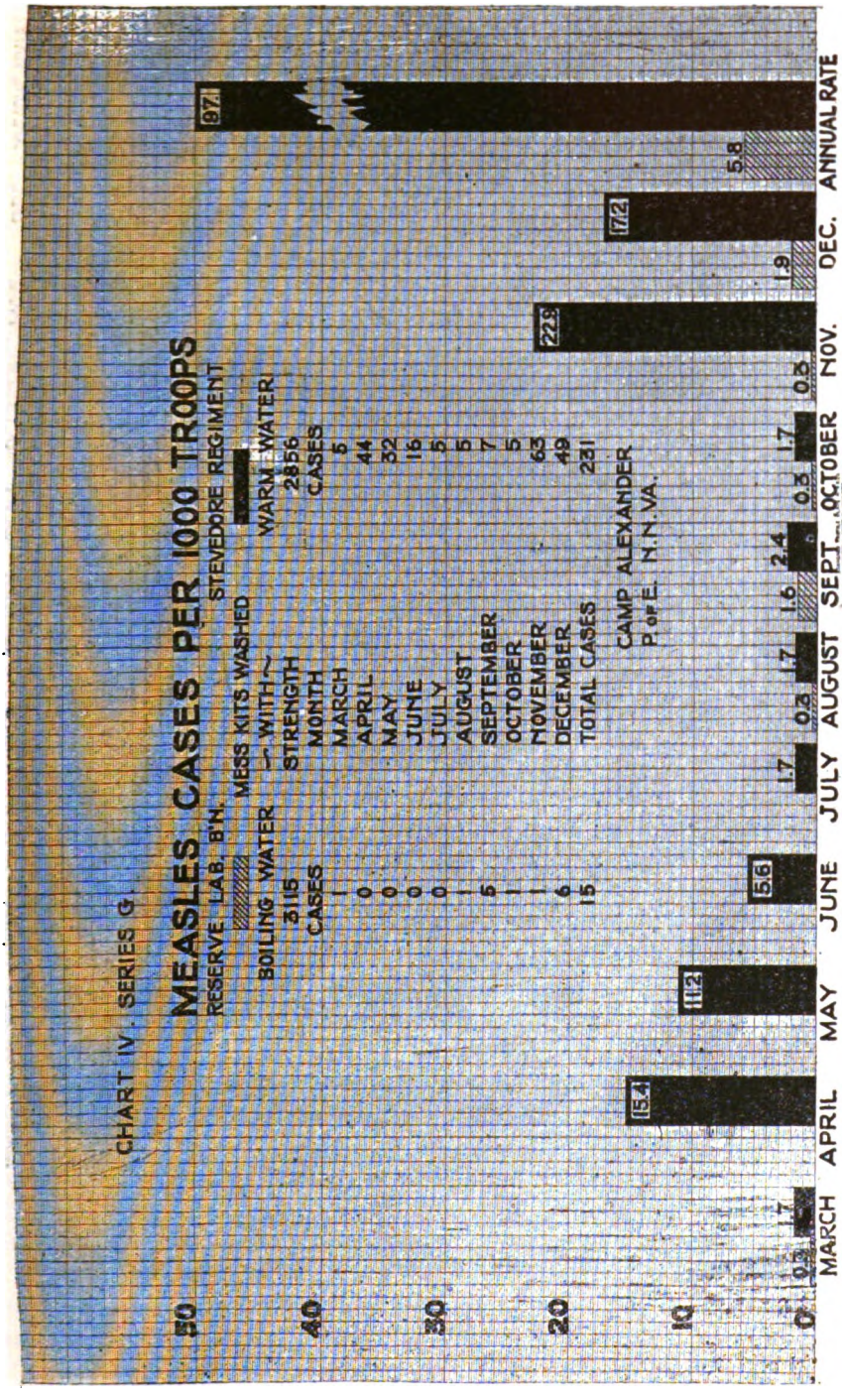

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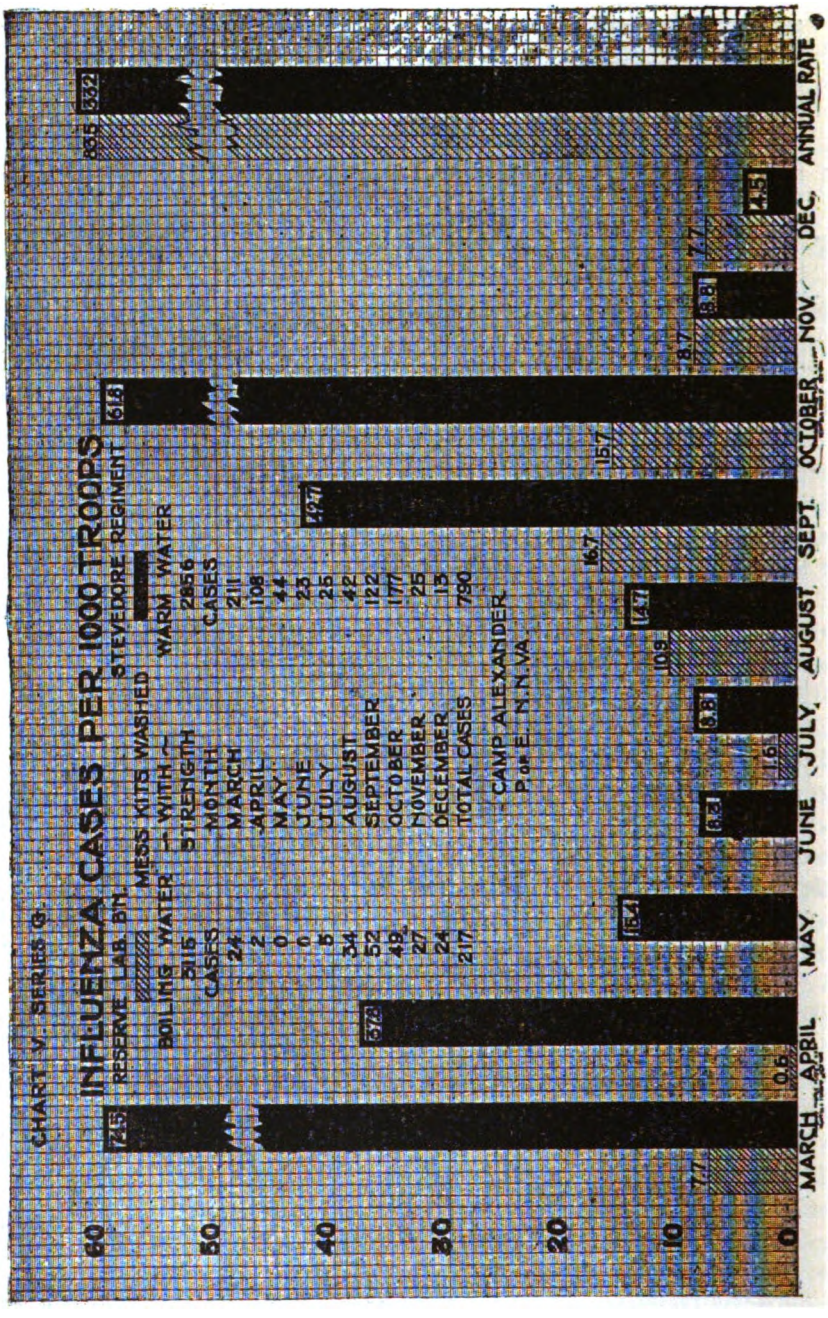

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Comparison of Reserve Labor and Stevedore Organizations.—In considering these two organizations, a liberal comparison is made so that, in making a study of the morbidity and mortality records here presented, the full data may be taken into account. The mean strengths of the two organizations were similar: the reserve labor battalion 3,115, and the stevedore regiment 2,856. From month to month these strengths varied within narrow limits. In the reserve labor battalions there was an average "turn over" in the organization every eight weeks, while in the stevedore regiment this replacement was every fifth week. Both organizations were under the same line and medical supervision; both had a common source of commissary and quartermaster supplies. There was a common water supply. Throughout the entire camp the shelter was of tentage, five men to each tent. All tents were heated. Each company in the camp had its own mess hall and lavatory of standard construction. The prevailing weather conditions were the same for both groups. In neither organization was there undue fatigue at any time. Passes were limited for all men in camp; consequently the possibility of introducing infection from extra-cantonment areas was the same for both groups. With the exception of officers the camp was composed entirely of colored troops.

So far as the foregoing points are concerned it would appear that both organizations in the camp lived under similar if not identical conditions. There are, however, two points of difference between these organizations: First, the reserve labor battalions were composed of men physically unfit for overseas service. Those troops were riddled with venereal disease; there were frequent cases of tuberculosis, rheumatism, ununited fractures, etc., all of which would, presumably, render this group more susceptible to the camp infections. The stevedore regiments, on the other hand, were composed of troops physically fit for stevedore work, which requires strength, endurance, and freeness from acute or chronic infections. Which of these organizations had the higher disease incidence? That one composed of men already suffering from chronic infections and other physical defects, or the one composed of physically fit men? This question will be decided in a subsequent discussion. Second, incinerators were constructed at each mess hall in that part of the camp set aside for the reserve labor battalions. These incinerators were installed during February, 1918, and presented a means of providing boiling water for mess-kit washing. Three galvanized iron cans were placed on each incinerator. One can contained soapy water and the other two clear rinse water. In addition to combustible camp waste, there was an adequate supply of wood for each incinerator. Although no attempt was, at any time, made to have the water actually boiling at every meal, it is believed

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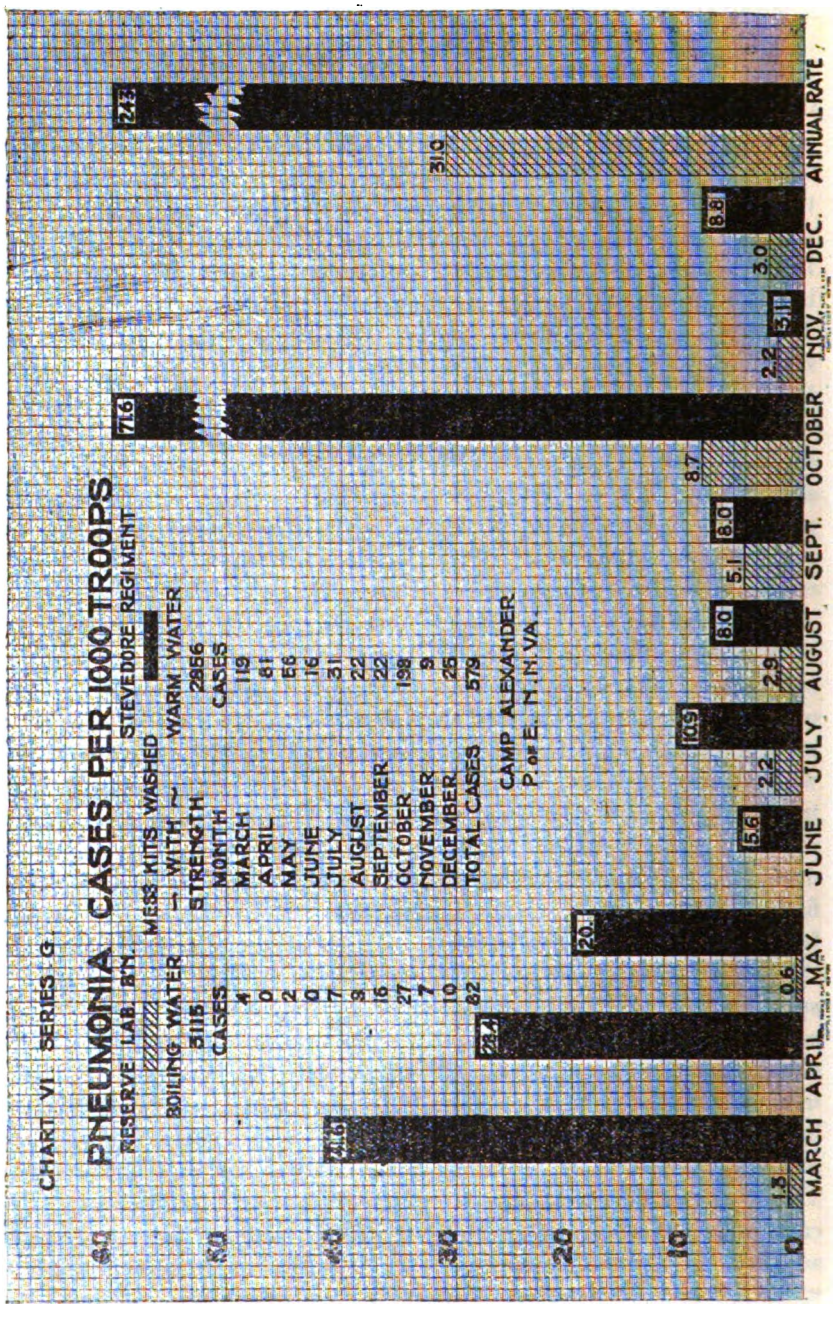

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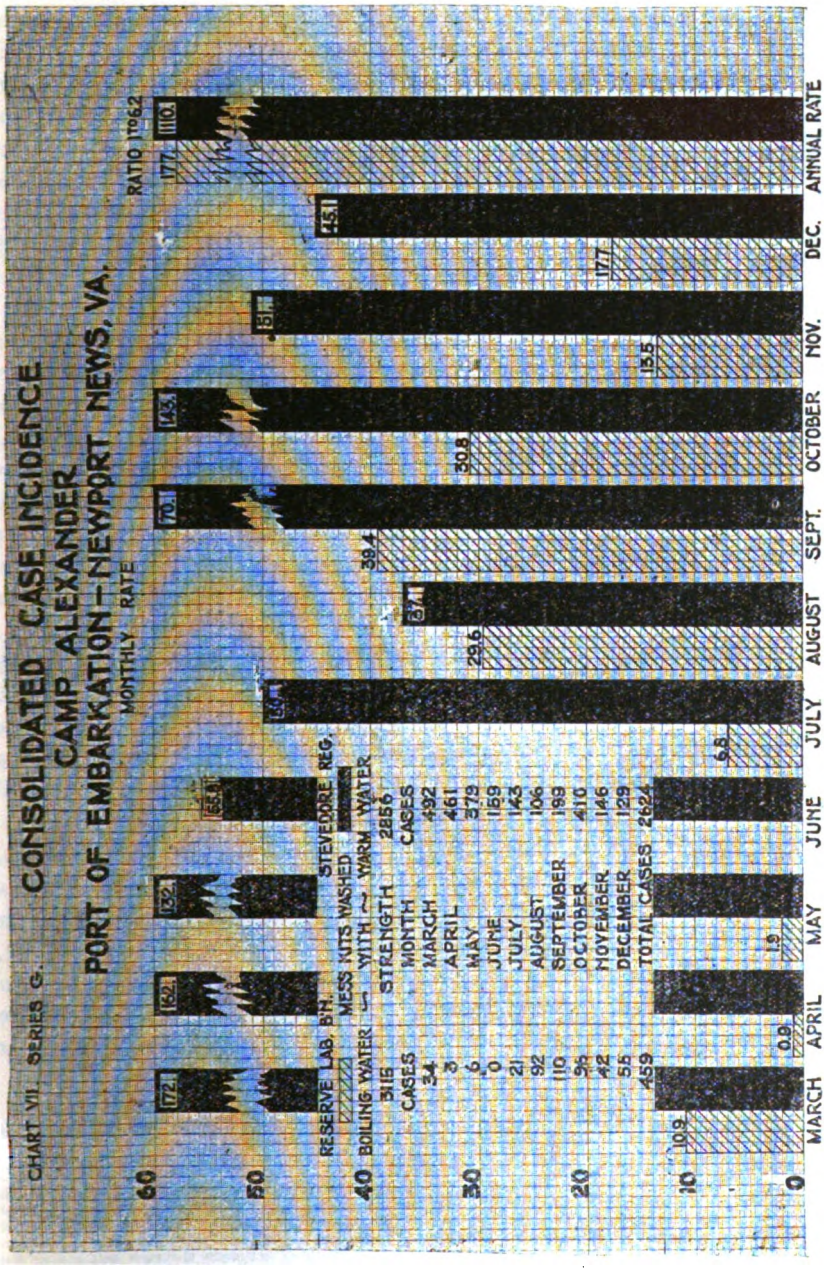

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from occasional observation that a high temperature was usually maintained. In contrast to these reserve battalions, which washed their mess kits in water which was placed over fire, it is to be pointed out that the stevedore regiments washed their mess-kits by the old-line method. The only method of providing hot water in that part of the camp occupied by the stevedores was by the kitchen range, which had an attachment to a hot-water boiler. This water was never above 30° C., and when, in field basins, it was placed on the ground, it rapidly cooled. Consequently the average temperature of the water at the time of washing mess kits was 45° C.

In former reports we have pointed out that there is a difference in the infectious disease incidence between organizations using tableware and those using mess kits,[1] as well as between civil and institutional populations which use either machine or hand-washed eating utensils.[2]

In this report, however, attention is directed to the fact that here we have a unique comparison of two organizations, both of which used mess kits. From the sanitary viewpoint there was but one outstanding difference between the two groups. The reserve labor battalion used mess-kit wash water which was at or near the boiling point, while the stevedore regiments used only warm water.

On this basis of sanitary mess-kit washing the following morbidity and mortality charts are presented. These give the case rates by month per 1,000 troops for a period of ten months, as well as the annual rate for each disease. All the sputum-borne infections occurring in the camp are included in the charts. It will be noted that, on an annual basis per 1,000, troops, the ratio of cases for each disease in the protected group (reserve labor battalion), and in the unprotected group, (stevedore regiments) is for meningitis 1 to 28, diphtheria 1 to 2, mumps 1 to 8, measles 1 to 17, influenza, 1 to 4, and pneumonia 1 to 8. In Chart VII the consolidated case incidence, for all the above infections, shows that there were six times more cases in the unprotected than in the protected group; or, expressing it differently, 85 per cent of the cases occurred in the unprotected group. (The less important charts have been omitted.)[3]

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[1] Lynch and Cumming: "The Transmission of Influenza by Indirect Contact—Hands and Eating Utensils." *Am. Jour. Pub. Health*, January, 1919.

[2] Cumming: "Influenza—Pneumonia as Influenced by Dish Washing in 370 Public Institutions." In press. *Am. Jour. Pub. Health.*

[3] Attention has been called to the fact that nothing has been said here respecting the relative immunity of the two groups in question. It is true that on the average the soldiers of the reserve labor battalions had a little longer service than those of the stevedore regiments. This certainly did not exceed ninety days on the average. Intentionally, the maximum number of days is given, as an overstatement seems desirable rather than to arouse the possibility of criticism through not giving due weight to all modifying factors. Supposing the ninety days longer service of the reserve labor battalions is admitted. This doubtless would somewhat lessen the very wide differences shown by the figures in the paragraph to which this foot-note refers, but it is not conceivable that these differences would anywhere nearly wiped out.

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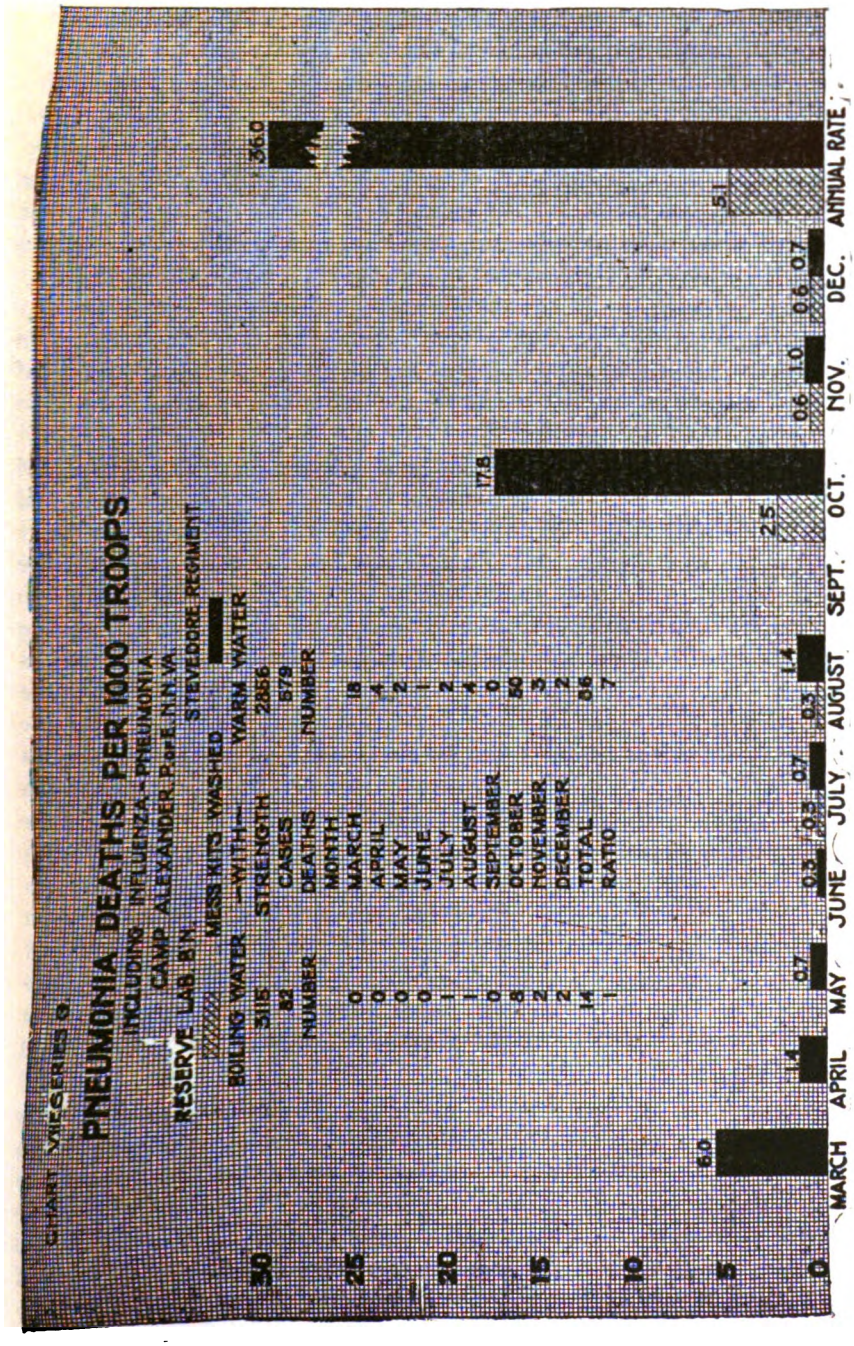

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Now, then, one might ask whether or not there could not have been a reduction in the case incidence in the unprotected group similar to that in the protected group had similar sanitary precautions been taken in both groups? In answer to this question the report speaks for itself. In my opinion in the Army the insanitary method of washing mess-kits has been the major avenue of distribution of the sputum-borne infections. An intensification of corrective sanitary measures bearing directly on this major avenue of transmission, as well as the avenue through inanimate objects and hand-to-mouth distribution, will accomplish results by the prevention of the sputum-borne diseases equally striking to those results already accomplished through definite sanitary precautions in the control of the intestinal-borne infections. The intelligent application and enforcement of the principles of asepsis of eating utensils and of hands will render the military service as safe to life as any civil community.

In fact it may be predicted that in a well-organized and disciplined army of the future, with coöperation on the part of line officers and medical officers, the death rate from disease will be lower in the Army than in the civil population. This has not been so in the past, but the Army will have the opportunity during the next influenza epidemic to demonstrate to municipal health officers the value of asepsis of eating utensils and of hands, as a means of control of this sputum-borne infection. At that time the Army will have been trained; those in the city will be untrained in these precautions, and when the epidemic occurs it will be too late. It may be of interest to state that, as a result of the influenza epidemic, among a group of 9,000 troops protected to a degree against unsanitary eating utensils, the mortality was only 2 per 1,000 troops; whereas in the average civil population this mortality was 5 per 1,000, and for all troops in the United States 14 per 1,000.

I will not enter into a further discussion of this wide difference in the mortalities of these several groups at this time, but suffice it to say that there will not be a diminution in the mortality from the sputum-borne diseases until the popular demand for aseptic eating utensils in public places, as well as in the Army, is as urgent as is the present demand for a safe water supply.

Chart VIII is of interest in that it shows, for the period of the investigation, the pneumonia death rate for the two groups at Camp Alexander. It is of further interest since 94 per cent of the total deaths were either primary or secondary pneumonias. Virus infections were not immediate causes of death, but these paved the way for the fatal secondary pneumonias. In addition to pneumonia the only cause of death from disease was meningitis, there being eight fatal cases in the

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unprotected group. The striking point in this chart is that there were seven times more deaths in the unprotected than in the protected group; or, to express the death rates in a different form, it is found that 88 per cent of the total deaths occurred in that group where no attempt was made to block that major avenue of transmission through mess-kit wash water. If formerly we had had as full information as to the importance of this avenue of distribution, it would have been possible to have reduced the mortality in the unprotected to that of the protected group.

The pneumonia producing group of organisms is, then, the chief cause of death among troops, and in the civil population one of the chief causes of death. This group of organisms is not as highly infectious, as is, for instance, influenza or measles virus. Furthermore, these organisms have a seasonal prevalence of distributions, and if, as has been the case in the Army, the avenues of transmission are not blocked, they become widely disseminated and prevail chiefly in the tonsils of healthy carriers. This wide prevalence does not manifest itself immediately but lies dormant until the occurrence of a virus infection.

The pneumonia organism with which we become infected today does not kill tomorrow, but it lies in wait as a potential danger and is able to kill only when the opportunity arises to combine its own forces with that of a virus infection.

As is shown in the chart here presented, the aseptic washing of eating utensils among troops, this applies to the civil population as well —will accomplish marked results in preventing the pneumonia carrier state.[4] Furthermore, by the practice of this sanitary precaution not only are the pneumonias prevented, but there is also an automatic control of the virus and other sputum-borne infections.

Chart IX (omitted) is a consolidation of pneumonia cases, case fatalities and deaths; 31 cases occurred in Reserve Labor Battalions and 243 in the Stevedore Regiment, a ratio of 1 to 8. In contrast to the ratio of cases, attention is directed to the fact that this ratio tends to reverse itself in the case fatalities, which were 200 in the Reserve Labor Battalions to 173 in the Stevedore Regiment, a ratio of 1.5 to 1. Here again we have this remarkable phenomenon of a greater case fatality rate in the protected than in the unprotected group. The theory of this repeated finding has been set forth in a previous report. The mortality rate per 1,000 troops for the two groups was in a ratio of 1 to 7 or 88 per cent of the total deaths occurred in the unprotected group.

[4] Cumming and Spruit: "The Transmission of the Pneumonia Group of Organisms." In press. *Jour. Inf. Dis.*

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If we turn our attention to the good accomplished in the protected group, through the single sanitary measure here dwelt upon, it is found that among 3,115 soldiers there was an annual saving in the hospital care of 659 patients in addition to the saving of 95 lives. This record can be duplicated in other camps, and in the future it can be improved. In this connection the medical officer is almost entirely responsible, and it would be of interest to note the result attained if the present general method of efficiency rating of these officers were in part replaced by a system dependent upon the sick rate among troops under their control. Just as the intestinal-borne disease incidence is an index of the safety of the water supply and of the carrier rate in any municipality, so also is the sputum-borne disease incidence an index of the asepsis of eating utensils and of the carrier rate in any municipality or command. On the basis of aseptic mess-kit washing the epidemiologic evidence here presented may be regarded as ample proof of the importance of this sanitary detail.

In previous reports the deductions, as to the importance of this detail, have been based entirely on field investigations and morbidity records. In order, however, to further support our theory as to the avenue of transmission of the sputum-borne infections, through unsanitary mess-kit washing, there is here presented additional evidence of an experimental nature.

It may be well to outline briefly this theory of contagion transmission. In unrecognized as well as recognized cases of the sputum-borne infections, the oral cavity is the reservoir of the infectious virus. From here the infection is distributed through different routes, chiefly through the contamination of those objects which most frequently come in contact with it. Chief of these objects are eating utensils and hands. Compared to these, other objects, as well as air, are of minor importance. We have previously reported that organisms common to any particular individual's oral cavity are also common to that individual's hands.[5] Likewise the soldier's mess-kit is contaminated with the particular species common to his own oral cavity. So then, should a soldier harbor an infection, acute or chronic, his mess-kit and his hands are contaminated with this particular infection. At the mess, when warm water was used, his mess-kit and his hands were washed, for his hands were frequently used as mops.

The infection was, then, transferred from the mouth to the warm water by two routes—the mess-kits and the hands. Mild, unrecognized cases of the virus infections, and acute and chronic carriers of the poten-

[5] Cumming and Spruit: "The Transmission of the Pneumonia Producing Group of Organisms. In press. *Jour. Inf. Dis.*

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tially dangerous infections, especially hemolytic streptococcus carriers, contaminated the mess-kit wash water three times a day, as long as they harbored their infection. This mess-kit wash water having an optimum temperature and being a liquid medium, readily passed on the infection to others. What are the avenues of travel of the infection from the contaminated wash water to the mouth of the newly infected individual? Here again, as in the case of the carrier, the non-immune individual immerses his hands as well as his mess-kit in the wash water. These are both liable to contamination, and they are both introduced into the oral cavity, where they deposit the newly acquired infection. This completes the five link chain of transmission: (1) Oral cavity of infected to (2) hands and (2A) mess-kits to (3) wash water to (4) hands and (4A) mess-kits to (5) oral cavity of newly infected.

Attention may be called to the fact that the wash water serves in the place of intermediate inanimate objects in the case of the single link chain or indirect hand-to-mouth avenue of transmission. The single link chain is common to civilians and soldiers alike, but in the Army the third and fourth links are double links, thereby doubling the possibility of transmission. Civilians are exposed chiefly through two routes—hands and eating utensils. Their hands may become contaminated through inanimate objects which are handled by many people, but not by that source—mess-kit wash water—common to all soldiers; and the contaminated hands of the civilian enter his mouth just as is the case among soldiers. Eating utensils are the most common source of distribution among civilians. These utensils are partially washed in only warm water, they are not rendered aspetic, and there is an exchange of these at each meal. With this exchange of utensils there is an exchange of mouth organisms. As in the laboratory the platinum loop is used to transfer a culture from one test tube of medium to another, so also the unboiled eating utensil transfers infectious as well as non-infectious organisms from one individual to another. In contrast to this exchange of utensils among civilians, the soldier uses his own mess gear, but his hands, as well as his mess gear, become contaminated by the use of the common wash water. These double links among troops are the most prolific sources of infection, and these in conjunction with the third link, which is liquid and common to all soldiers, make for facility of transmission. These multiple avenues were peculiar to the Army and they alone explain the high sputum-borne disease incidence and the explosiveness of these epidemic diseases among troops where the asepsis of mess-kit washing was faulty. On the other hand, it must not be overlooked that, as shown in the charts, it is possible in the Army, to maintain, by the boiling of mess gear, a lower sick rate and mor-

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tality rate than is found in the average civilian population. For the influenza-pneumonia epidemic the mortality in our protected group was less than one-half that of the average city.

In order to prove the above theory, which was based purely on observations of the technique of mess-kit washing, and determinations of the bacterial counts of wash waters, numerous laboratory experiments were carried out, at the port laboratory, Newport News, Va., by the author and Capt. J. W. Cox, M. C., U. S. A. The preliminary experiments in the series will be covered by a brief statement only, and three final transmission experiments will be given in detail.

As a preliminary it was first proved by spraying the throat, mouth and lips with a suspension of *B. prodigiosis* before each of six meals that the hands, the mess gear and the wash water would become contaminated with this organism. This series of tests carried us to the third or middle link—wash water—in the chain of transmission. It then remained to prove whether or not mess-kit wash water so contamined would accomplish the last links in the transmission chain.

[The inoculating culture of *B. prodigiosis* was prepared by growing the organism on 2 per cent potato agar in large Petri dishes for twenty-four hours and transferring to salt solution. The growth of three Petri dishes was suspended in 100 c.c. of salt solution and thoroughly shaken. This gave a fairly heavy suspension for inoculating purposes. Preliminary throat swabs were taken from all men used in the experiments to determine whether or not they were free from the test organism.]

I. TRANSMISSION EXPERIMENT OF JULY 15, 1919

Ten men were used in this experiment. Prior to each of six successive meals, the throats, mouths and lips of five of these men (donors) were sprayed with a suspension of *B. prodigiosis*. After each meal these same men washed their mess gear in one gallon of warm water. The hands were used as mops in the washing process. Then, after the washing process had been completed by the five sprayed men, the five unsprayed men (recipients) likewise washed their mess gear in this same (donors) wash water, afterwards using it to eat with. This procedure was followed for six meals.

Findings.—(1) After each of the six meals throat swabs were taken from the five sprayed men (donors). Of these thirty specimens, 16, or 53 per cent, were positive *B. prodigiosis*.

(2) After each of the first three meals these sprayed men washed their hands in 500 c.c. of clear warm water; the same water being used for all men. About 50 c.c. of this was centrifugated and plated on

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potato agar. Of these three specimens, 1, or 33 per cent, was positive for the test organism.

(3) The spoons of these men (donors) were pooled, and the wash water was cultured for *B. prodigiosis*. Of the six specimens, 1, or 16 per cent, was positive.

(4) The examination of the mess-kit wash water showed that, of the six specimens of each successive meal, 4, or 66 per cent, was positive for *B. prodigiosis*.

(5) The pooled hand-washings of the first three meals from the unsprayed men (recipients) were negative in this experiment.

(6) As in the case of the sprayed men the spoons of the five unsprayed men were pooled and washed. Of the six specimens of wash water, 3, or 50 per cent, were positive for the test organism.

(7) Specimens from the oral cavity of each unsprayed man (recipient) were obtained by a pooled swab of the tonsil, teeth, and lips. These were taken after the last three meals in the series. The results for each meal were as follows: fourth meal, 2 out of 5 specimens were positive; fifth meal, 2 out of 5 were positive; sixth meal, 1 out of 5 positive. Of the total fifteen specimens, 5, or 33 per cent, were positive for *B. prodigiosis*.

Summary of Positive Cultures in the Five-Link Chain

Links 1	*Donors* 2	3	*Recipients* 4	5
Oral cavity 33%	Hands 33% No. 2A Mess-kits 16%	Mess-kit wash water 66%	Hands 0% No. 4A Mess-kits 50%	Oral cavity 33%

In this experiment it will be noted that with the exception of one ring of the double link—4—the chain of transmission is complete.

II. EXPERIMENT OF JULY 22, 1919

In this experiment, as also in the one following, five men were used as donors of the infection and five as recipients. Before each of six meals, the mouths and hands of the donors were infected with a suspension of *B. prodigiosis*. Each gargled with about 10 c.c. of the suspension and his hands were sprayed with the suspension. Having contaminated the hands as well as the mouth there was produced a condition simulating the natural contamination in the case of sputum-borne infections. As in all experiments the donors preceded the recipients in washing their mess kits in warm water. (In this experiment as in that of July 25, the two links in the donor's chain, and the

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intermediate link—wash water—were not covered by bacteriologic tests.)

Findings.—Covering the double fourth link and the single fifth link the procedure and results were as follows: Each of the five men, the recipients, after washing their mess-kits, washed their hands for five minutes in 500 c.c. of clear warm water. About 50 c.c. of this was centrifugated and plated. Of the thirty specimens thus obtained, 16 or 53 per cent were positive for *B. prodigiosis*. The spoons, knives and forks of the recipients were pooled after washing, and briskly shaken for five minutes in 300 c.c. of clean warm water. This was centrifugated and cultured. Of the six specimens 5 or 83 per cent were positive. Specimens from the oral cavity were obtained from each man (recipient) by scrubbing the teeth, tongue and lips with a sterile tooth brush and 50 c.c. of sterile water. In order to avoid the possibility of contamination with *B. prodigiosis* from the hand during the scrubbing process a sterile glove was used. Of the thirty specimens of mouth washings 4 or 13 per cent were positive for the test organism. These four positive cultures were from four different men.

Summary of Positive Findings in Recipients

4—Hands 53%	5—Oral cavity 13%
4A—Mess-kits 83%	

III. EXPERIMENT OF JULY 25, 1919

In this experiment the procedure of the foregoing one was duplicated with the same group of men. The results were as follows: Of the thirty hand washings 11 or 36 per cent were positive. Of the six pooled mess-kit rinsings 5 or 83 per cent were positive. Of the thirty mouth washings 17 or 56 per cent were positive.

Summary of Positive Cultures in Recipients

4—Hands 36%	5—Oral cavity 56%
4A—Mess-kits 83%	

This experimental research shows the facility with which a non-pathogenic organism may be transmitted from donor to recipient through the use of warm mess-kit wash water. The results of these tests in conjunction with the epidemiologic research, indicate that mess-kit wash water was the most prolific source of distribution of pathogenic organisms and virus infections among troops. These results are wholly corroborative of our previously advanced theory of transmission through warm mess-kit wash water, and of the paramount importance of the use of boiling water as a means of closing the major avenue of disease distribution.

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MUSEUM AND ART SERVICE OF THE AMERICAN EXPEDITIONARY FORCES[1]

By Colonel Louis B. Wilson, M. C.
Assistant Director, Division of Laboratories, A. E. F.

IN JANUARY, 1918, the Surgeon General requested authorization from the Commanding General A. E. F. to send a National Army Medical Museum Unit to France with the writer named as director. After receipt of the authorization, and after a delay of two months in planning for the collection of museum material in the camps and cantonments of the United States, the writer was ordered first to England to study the collections and methods of collecting by the British and colonial armies, and then to France for duty. In the meantime Circular No. 17 had been issued by the Chief Surgeon of the A. E. F., calling attention to the importance of collecting museum specimens and giving brief directions for their preservation.

The collection of museum and art material in France was placed under the direction of the Division of Laboratories. It was early apparent that the collection of pathologic material would be wholly dependent on the pathologists who would be making postmortems. The first task, therefore, was to assist in building up the necropsy service in the A. E. F., which at that time was very inadequate owing to lack of personnel. The need of a routine necropsy service in the A. E. F., serving as professional inspection of the diagnostic and therapeutic measures of the medical officers, became rapidly apparent during the summer of 1918. This inspectorial need was filled in a satisfactory manner, and atlhough at no time were there enough pathologists to permit them to give more than incidental attention to the collection and preservation of pathologic material, on the whole the results were better than might have been hoped for under the conditions.

In 1917 a General Order forbade the use of cameras in the A. E. F. by anyone except the Signal Corps. In March, 1918, an elaborate schedule for the taking of photographs by the Signal Corps to be used to illustrate the Medical History of the War was approved by the Chief Surgeon of the A. E. F. In order to provide for the taking of technical photographs other than those to be used in illustrating the medical history, request was made early in May for the privilege of cabling for photographers and artists who were then in readiness to proceed from the Army Medical Museum in Washington. Approval of this request was refused by the General Staff "in view of the existing tonnage situation." The General Staff's endorsement further stated: "In this connection, it is believed

[1]Abstract of chapter written for the History of the Medical Department, United States Army.

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that the requirements of the Medical Corps may be successfully met in this particular by the personnel and facilities already here in both the Signal and Engineer Corps." The lack of men with special training in medical illustrating in the Signal and Engineer Corps and the necessity for this special training for the production of good work were pointed out in another memorandum in July, and one officer and seven enlisted men, specially trained artists, were cabled for and arrived in France September 14, 1918.

On May 25, 1918, G. O. 78 amended previous orders and gave to the Medical Department authority to make "technical photographs of surgical and pathological interest." A survey was made of the Medical Department personnel in the A. E. F., and several photographers were found with training in the taking of photographs of medical subjects. Owing, however, to the order previously issued forbidding the taking of photographs, almost no hospitals were equipped with cameras or other photographic apparatus. Those that were so equipped were authorized to place their apparatus in use. A few cameras were available from French sources, three were borrowed from the Signal Corps, and twenty-four from the Roentgenologic Department. A limited amount of photographic supplies was obtained from French sources.

A survey of the feasible sources of supply, American, French, and British, revealed the fact that nothing but formalin was obtainable for fixation of pathologic specimens, except that a few base hospitals first to arrive in France had brought over with them a small supply of alcohol. The only materials available for color preservation were sodium or potassium acetate and nitrate, one or the other of which was obtained after long delay from French sources. These materials, photographic and pathologic, were placed in the Central Medical Supply depot, where they suffered along with other medical supplies from inadequate facilities for distribution.

After a careful survey of the situation, Circular No. 42 was issued, of which the following is an abstract:

AMERICAN EXPEDITIONARY FORCES

CIRCULAR NO. 42. FRANCE, 27th *July*, 1918.

COLLECTION OF MUSEUM MATERIAL FOR MEDICAL EDUCATION AND RESEARCH

1. *Object.*—This circular is for the information of those branches of the service whose coöperation and assistance are necessary to enable the Army Medical Museum to discharge its duty of collecting all those things which may be used for medical education and research or which may be of historical interest. This material will consist of pathological specimens, bacteria, animal parasites, missiles, armor, instruments, apparatus, casts, models, paintings, drawings, diagrams, charts, statistical

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tables, cinema films, photographs, radiographs, lantern slides or other things pertaining to the preservation of the health and the prevention and treatment of the diseases of the United States soldiers or to the history of the Medical Department of the Army.

2. *Scope.*—In France all collections will be limited to those things which can not be obtained readily in the United States or which are necessary for study in the A. E. F. More specifically these will relate principally to war wounds, especially lesions of the bones and vital organs, gas poisoning, trench foot, gas gangrene, traumatic and shell shock, to infections and parasitic diseases of special menace to the A. E. F. and to material of historic interest. Other material may be included if obviously desirable.

. . . . .

3. *Responsibility.*—It is the duty of each medical officer in the A. E. F. to direct into proper channels all such desirable material coming to his notice. In each medical unit the pathologist, or in his absence some other medical officer, will be responsible for the collection, preservation and shipment of all such material obtainable in the unit.

4. *Use in A. E. F.*—Collected material required for investigation in the A. E. F. will be shipped as early and as directly as possible to the groups of officers conducting the investigations in such manner and quantity as they may request.

. . . . .

After serving the needs of the immediate investigation the material, if still of value, will be preserved. . . .

5. *Concentration Points.*—All other collected material will be shipped without unnecessary delay to concentration points (Headquarters Laboratory Division, Base Laboratories, Base Sections, etc.). . . .

. . . . .

6. *Final Disposition.*—At the concentration points the Museum Unit will take charge of the future preparation of all material and its shipment to the Army Medical Museum.

. . . . .

7. *Pathological Specimens.* (Detailed directions for fixation and preservation.)

. . . . .

8. *Shipment.*—When pathological specimens have been fixed for two weeks or more they should be well padded with absorbent cotton, wetted with the solution in which they have been last immersed, and then wrapped in water-proof paper (to be obtained by requisition) and packed with paper, excelsior, hay or similar material in a strong wooden or tin box or barrel and shipped to the most accessible point of concentration. . . .

9. *Bacteria.* . . .

10. *Microscopic Slides.* . . .

11. *Animal Parasites.* . . .

12. *Missiles.*—For the psychic effect a missile removed from the body of a wounded soldier may be given to him if he wishes to keep it. However, he may be induced to relinquish his claim when the scientific value of a comparative study of such missiles and their preservation in a museum is explained to him. The place and character of all missiles in amputation material should at least be accurately described and, if possible, sketched. All missiles and foreign bodies removed at autopsies should be carefully preserved, if possible *in situ*, with the pathological specimen. When it is necessary to remove them, their location and wound effects should be

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minutely described, the description, if possible, being accompanied by photographs or sketches.

13. *Armor.*—Armor, such as helmets, or other protective body covering showing the effects of missiles, gases, etc., should, whenever obtainable, be preserved with full data concerning the incidents of their use. . . .

14. *Instruments and Apparatus.*—All instruments and apparatus of special value which have been developed or materially modified in the A. E. F. should be photographed, accurately described, and, if it seems desirable, models made.

. . . . . .

15. *Casts and Models.*—The number of skilled casts and model makers in the A. E. F. is extremely limited. When a medical officer has some specimen, or series of specimens or cases, showing results of operations which he wishes to have illustrated in wax or plaster, he should make application. . . . for the services of a model maker.

16. *Paintings, Drawings, Diagrams.*—It is believed that in many hospitals there may be found men capable of making diagrams and sketches, furnishing graphic records of teaching or historic value to the Medical Department. Well-trained medical illustrators, on the other hand, are scarce, and their services, to be utilized in an economical manner, must be centrally controlled. . . .

17. *Cinema Films.* . . .

18. *Photographs.* . . .

19. *Radiographs.* . . .

20. *Original Publication.*—All pathological specimens, casts, models, paintings, drawings, photographs, radiograms, etc., should be accompanied by the name of the medical officer collecting them, and of the medical officers, if any, specially interested in their subject matter. This is important not only for the occasional necessity of retracing them back to their origin for additional data, but also that the privilege of original publication of the data by the officer with whom they originated may be respected.

21. *Supplies.* . . .

M. W. Ireland,
Brig. Gen., M. C., N. A.,
Chief Surgeon.

As a result of the preliminary work above described, the increase in the total number of morbid anatomists and the placing of them at advantageous points and of personal appeals while inspecting laboratories, a considerable interest in the collection of museum material was developed. The battle activities in June and July, however, so overwhelmed the Laboratory Division, as well as other divisions of the Medical Department, that very few collections of pathologic specimens were made; the pathologists, still most discouragingly lacking in numbers, were hopelessly overworked and very rightly gave their attention to rendering information to the attending medical and surgical officers which could be of immediate service with the sick and wounded in as many cases as possible rather than to collecting pathologic material for scientific study in the future. In October and November the epidemic of influenza, coinciding as it did with the Argonne offensive, the period

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of greatest battle activity in the A. E. F., equally overwhelmed the pathologists, though by this time their number had materially increased During this period an excellent necropsy service had been developed, but attention could be given in only a minor degree to the collection of specimens. Nevertheless, despite the limited personnel and the lack of equipment, of supplies, of containers, of transportation, of time, and in fact of everything except an avalanche of tissues, upwards of six thousand pathologic specimens were collected, preserved, and shipped to the Army Medical Museum.

These specimens for the most part illustrate the principal groups indicated in Circular No. 42 and relate chiefly to war wounds and gas poisoning. Early lesions of war gas poisoning were especially difficult to obtain, owing to lack of transportation or pathologists and to the necessity for the centralization of specimens for immediate study at the pathologic laboratory in the Chemical Warfare Service with which the Medical Department attempted to coöperate in every possible manner. However, a small but a fairly representative collection of these lesions was obtained. A number of good specimens illustrating the more striking types of lung lesions occurring during the epidemic of influenza in the fall of 1918 were preserved. Lesions illustrating the often unique course of typhoid and paratyphoid fever in vaccinated men were also collected in considerable numbers during the fall and winter of 1918–1919. In addition, a fairly good collection of brain and cord and peripheral nerve lesions, of congenital anomalies, etc., was made.

The collection of about 2,000 selected microscopic slides of tissue was shipped to the United States.

A small collection of missiles which had caused injuries and which had been removed at surgical operations was preserved. Most of these missiles were, however, according to the instructions in Circular No. 42, returned to the wounded soldier. A fairly complete collection of unused small arms missiles and fixed ammunition of the various warring nations, together with a few specimens of heavy ordnance missiles and fragments thereof, was forwarded to the Army Medical Museum.

A representative collection of rifles, p'stols, bayonets, trench knives and other weapons directly concerned in the making of wounds was forwarded to the Army Medical Museum.

A large collection of helmets, which showed evidence of having been hit by missiles which they had either warded off or had been penetrated by, together with a small number of pieces of body armor and metal objects such as canteens, mess kits, trench mirrors, etc., which similarly had been struck by missiles, was collected and shipped to the Museum.

A number of medical and surgical instruments and pieces of ap-

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paratus of American, ally or enemy origin which had been developed or materially modified during the progress of the war were collected and shipped to the Army Medical Museum.

Several artists (medical illustrators, wax modelers *et al*) arrived in France attached to Base Hospital No. 115, which was stationed at Vichy, in September, 1918. An art and photographic section was therefore established in Vichy in the Central Laboratory of the Base Hospital Center, using this personnel and its equipment. Other artists were assigned from time to time to the work in this art section and were ordered out therefrom to various hospitals in the A. E. F. where medical illustrating was needed. This group produced 35 casts of surgical cases, about 200 drawings and paintings, and more than 1,000 photographs of technical subjects. In addition to these illustrations and photographs of technical subjects centered at Vichy, a number of other drawings, paintings and photographs of technical subjects were made in other centers, particularly at Allerey, Beaune, Chateauroux and Paris.

The cinema camerist, photographers and artists cabled for in August, as mentioned above, reported for duty to the Director of Laboratories September 14. This personnel was distributed as advantageously as possible, principally to cover the activities of combat divisions. Here they remained on duty until the signing of the armistice. Late in September, 1918, the Museum Section of the Division of Laboratories had been charged with the duty of coöperating with the Signal Corps in the making of photographs for the Medical History of the War. The Signal Corps, though it had been authorized in March, 1918, to prepare such photographs, had been able to cover but little of the medical activities of the A. E. F. except the more popular subjects which were needed for propaganda purposes. After the signing of the armistice, and as soon as the general photographers of the Medical Department could be released from their duties with combat divisions, a Photographic Bureau of the Medical Department was established in Paris for the making and collecting, both with Medical Department personnel and the Signal Corps personnel, photographs and moving pictures illustrating the Medical History of the War.

The negatives of the medical pictures taken by the Signal Corps Photographers were developed by them and two prints of each made for the Medical Department Bureau, the negative being retained by the Medical Corps. The negatives made by medical personnel were developed, printed and filed in the Medical Department Bureau. This bureau filed more than 10,000 still pictures, titled and cross-indexed. It supplied about 5,000 proof copies to hospital organizations for use in their several histories and 1,500 prints for medical officers of the General

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Staff of G. H. Q. The bureau also photographed about 350 dental specimens. It has made about 40,000 feet of moving-picture film of surgical and medical subjects, such as activities in and around hospitals, convalescent patients, psychiatric cases, etc. In addition, it filed about 20,000 feet of motion pictures made by Signal Corps photographers. Nineteen copies of the motion picture, "Fit to fight," were made for circulation in the A. E. F. Two other propaganda pictures—"Fit for America" and "How to Avoid Typhoid Fever"—and six copies of a two-reel anatomic venereal picture were also made.

The Radiographic Division, on request from the Division of Laboratories, packed and shipped about 2,000 selected X-ray plates from their point of origin directly to the Army Medical Museum. These were selected for their technical quality as well as for their scientific interest and cover in a number of instances special series of cases or series showing different stages in the treatment and healing of the same case.

Immediately on the signing of the armistice it became obvious that transportation facilities for specimens, not only within the A. E. F. but also from base ports to the United States, would be exceedingly limited. A supplemental museum circular was therefore issued from the Chief Surgeon's office giving directions for expediting transportation and calling attention to the desirability of obtaining material showing stages of healing, etc. As a result of this circular the transportation of pathologic specimens directly to base ports from their points of origin instead of through collection centers was materially expedited, though it resulted in having to depend on a large number of shippers for details concerning the individual specimens and consequent lack of detailed information in some instances. Shipment of museum material to the United States was greatly hampered by the confusion incident to general shipping conditions in France and to the lack of tonnage at the close of the war. All the specimens, however, were carefully packed, and it is believed they will not materially deteriorate even if delayed one or two years in transit.

. . . . . .

In planning for the future collection of material for the Army Medical Museum a definite policy should be clearly stated and adhered to. This should be based on the principle that such collections are primarily for purposes of education and research and only remotely of historic interest. Important historical material is rare, isolated, and difficult of recognition. That which is too often selected is only of curious interest and in a little while becomes museum junk. A brief Army Medical Museum Manual which should clearly define the objects of the museum collections, state in detail the material desired and why,

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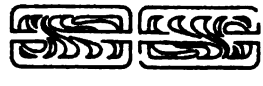
and give directions for simple methods of collecting, preserving, and shipping specimens, if widely circulated in the Medical Corps and among physicians, especially laboratory men in civil practice, would go far toward developing the proper conception of medical museums and greatly improve the character as well as increase the quantity of the collections. The coöperation of the Association of International Medical Museums might well be sought in planning such a manual.

In plans for future expeditionary forces of the United States Army it is suggested that the collection of the material for the Army Medical Museum be made a part of the duties of the Division of Laboratories. This division should also be charged with the duty of making, collecting, and forwarding moving pictures, photographs, drawings, paintings, models, etc., representing the administrative, general, and technical activities of the Medical Department in all its aspects. These photographs, if collected by previously prepared personnel and their supervision made the definite duty of every laboratory officer, would be of inestimable value from both the historical and scientific stand-points. Restrictions on photography, such as operated early in the history of the A. E. F. so greatly to hamper the activities of the Medical Department, would seem to be unnecessary for safeguarding information, the Laboratory Division no doubt being as trustworthy as the Signal Corps. Preparation should be made in peace-time for the selection of trained personnel for the various highly specialized functions which must necessarily be performed. Provisions should also be made for a standard photographic equipment to be supplied to the laboratories of various types. Special attention should be paid to photographs of methods of handling the wounded and of the appearance and treatment of battle injuries in forward areas, an adequate knowledge of the conditions of which is so essential and yet so difficult to convey to the inexperienced medical officer.



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REPORT OF SIX CASES OF TRAUMATIC ANEURYSM[1]

By R. E. FLANNERY, M.D., F.A.C.S., CHICAGO AND ALBERT R. TORMEY, M.D., B.S., MADISON, WIS.

SIX cases of aneurysm, as a result of trauma from gunshot, were found in this hospital in 3,311 surgical cases admitted from July 20, 1918, to November 12, 1918. Traumatic aneurysms, which in civil life are rather rare, being due mainly to stab wounds and injuries by machinery, have increased greatly in number in this war as the result of reduction in the caliber of the military rifle and the increased popularity of the machine gun. The machine-gun bullet or the .30 caliber jacketed bullet is capable of notching a vein or artery without great destruction, whereas the larger pieces of ordnance frequently destroy large sections of the vessel, as well as the soft tissues and bone.

Frequency of Traumatic Aneurysm.—La Garde reports 74 cases in the Civil War; 44 in the Franco-German War, and at Santiago, in 1898, five cases were observed in 1,400 wounded. The number of cases in this great European War will not be known for some time to come, but it is safe to say that they will number several thousands when the final statistics of the Allied and Central Powers are published. For instance, Zahradnicki, in 1915, presented a series of 425 cases collected by 45 different authors in the Turko-Balkan War of 1912 and 1913, and the first two years of the world war.

Vessels Involved.—As is shown in the chart on page 175, we had two arterial, one venous, and three anterio-venous aneurysms in this series. The vessels injured were widely distributed for so small a series of cases; the vertebral arteries and the internal jugular vein were injured in case I, the brachial artery and vein, the femoral artery, popliteal artery, the popliteal artery and vein and the anterior tibial vein making up the other cases.

Following is a brief history of each case:

Case I.—Pvt. B, Co. C, 108th M. G. Bn. Wounded: August 31, 1918. Diagnosis: G. S. W. multiple, including right side of neck, penetrating, entrance posterior triangle lower third below ear. Admitted to Base Hospital No. 11 September 9, 1918.

On September 15, 1918, patient complained of pain down entire right arm. On examination there was a small elongated mass 7 by 4 cm. immediately below scar of debridement at the point of entrance of the bullet in the neck; expansile pulsation and a machine-like systolic bruit. Pressure with adhesive tape was applied and absolute rest in bed ordered. The mass continued to increase in size, and on September 18, 1918, the patient was operated.

Diagnosis: Arterial venous aneurysm secondary to G. S. W.

[1]From Surgical Service of Base Hospital No. 11, France.

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Name	Wounded	Diagnosis	Admitted to A. B. H. No. 11	Signs and symptoms	Vessels involved	Date of operation	No. of days meter injury	Results
I. Pvt. B, Co. C, 108th M. G. Bn.	Aug. 31, 1918..	G. S. W. multiple. Right side neck, penetrating lower third posterior triangle.	Sept. 9, 1918..	Mass. Pain down entire right arm. Expansile pulsation. Systolic bruit.	Vertebral artery and internal jugular vein.	Sept. 18, 1919.	18	Died
II. Musk. H, P. W., 169th Inf..	Nov. 1, 1918..	G. S. W. multiple. Left fore-arm, anterior aspect, perforating lower end of biceps. F. C. C. skull. Partial destruction frontal bone.	Nov. 11, 1918.	Mass. Pain, edema; expansile pulsation; bruit.	Brachial artery and vein.	Jan. 2, 1919...	62	Died. Basilar meningitis.
III. Pvt. H, Co. D, 12th F. A....	Nov. 4, 1918.	G. S. W. left thigh, middle third, from aeroplane M. G.	Nov. 12, 1918.	Mass. Bluish discoloration; pain; edema.	Femoral artery, left leg.	Nov. 26, 1918.	22	Cured.
IV. Pvt. S, Co. B, 111th Inf....	Nov. 19, 1918.	G. S. W. right leg, lower third, penetrating. Severe.	Nov. 22, 1918.	Mass. Edema of foot; pain and fluctuation.	Anterior tibial vein.	Nov. 1, 1918..	11	Cured.
V. P t. A, M. D., 28th Inf.....	Nov. 6, 1918.	G. S. W. right knee, perforating. Severe.	Nov. 11, 1918.	Mass. Expansile pulsation; stiffness of knee-joint.	Right popliteal artery.	Dec. 9, 1918...	40	Cured.
VI. Cpl. W, Co. K, 16th Inf....	Oct. 4, 1918...	G. S. W. right knee, perforating.	Oct. 13, 1918..	Mass. Expansile pulsation, thrill, to and fro murmur.	Popliteal artery and vein.	Nov. 21, 1918.	48	Cured.

Shortest time between injury and operation, 11 days.
Longest time between injury and operation, 62 days.
Average time between injury and operation, 33.5 days.

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Operating notes: Dissection of right neck exposed pulsating venous-walled sac 1 inch in diameter by 2 inches long, situated under the sterno-cleido muscle at its center; this sac being intimately connected with the common carotid artery and internal jugular vein above and below sac. Pressure on these ligatures in no way stopped blood supply to sac. It remained same size and pulsating.

In attempting to dissect out sac at external border, same ruptured at posterior aspect, severe hemorrhage ensuing. On introducing finger into aneurysmal sac, rough denuded fifth and sixth cervical vertebrae could be felt, which formed part of the sac apparently communicating with vertebral artery. Aneurysmal sac packed with gauze and wound closed.

Case II.—Musketeer H, prisoner of war. Wounded: November 1, 1918. Diagnosis: G. S. W. Multiple. F. C. C. frontal bone; loss of skull substance, and hernia of brain with membrane protruding through opening. Left arm, anterior aspect, lower end of biceps perforating. Severe. Admitted to Base Hospital No. 11, November 11, 1918.

Patient had no history; showed marked aphasia and was delirious. On November 27, 1918, answered questions fairly well. Had only partial motor aphasia, knee reflexes increased, no Babinski or ankle-clonus. Swelling on lower left arm, increasing gradually, very hard, only slight expansile pulsation, systolic bruit present. Mass on arm gradually increased in size.

Diagnosis: Arterio-venous aneurysm, brachial artery and vein.

Operation: January 2, 1919. A large clot was removed and both ends of the artery and vein ligated. Incision was closed tight.

Progress: Compensatory circulation had been established and there was no disturbance in the blood supply to the fore-arm and hand. Patient died of Basilar meningitis, secondary to F. C. C. of frontal bone.

Case III.—Pvt. H, Co. D, 12th F. A. Wounded: November 4, 1918. Diagnosis: G. S. W. left thigh, from aeroplane M. G. Penetrating middle third. Severe. Admitted to Base Hospital No. 11, November 12, 1918.

Had been debrided on November 6, 1918. Foreign body not removed. On November 20, 1918, a radiograph showed an incomplete comminuted fracture just below junction of middle and lower third of left femur with M. G. bullet in soft tissue. On November 23, 1918, a small mass, about the size of a hen's egg, was noticed on the inner side, lower third of left thigh. There was some bluish discoloration, but no pulsation nor thrill.

Diagnosis: A diffuse traumatic aneurysm of femoral artery.

Operation: November 26, 1918. 400 c.c. of clotted blood and M. G. bullet removed. The femoral artery was ligated at its proximal end and the wound packed with medicated gauze.

Progress: On December 9, 1918, after two weeks of Carrell-Dakin's treatment, the wound was clinically and bacteriologically clean, and wound was secondarily sutured. On December 18, 1918, the stitches were removed. December 20, 1918, no edema of foot or disturbance of circulation. January 1, 1919, walking around ward in good condition. Discharged, cured.

Case IV.—Pvt. S, Co. B, 11th Inf. Wounded: October 19, 1918. Diagnosis: G. S. W. right leg, lower third, penetrating. Entrance at level of external condyle right tibia; exit anterior surface, junction of middle and lower third. Severe. F. S. fibula, right lower third. Admitted to Base Hospital No. 11, October 22, 1918.

Wounds of entrance and exit practically healed, but there was a small hard mass about the size of a hen's egg, slightly fluctuating, on the anterior surface of right leg,

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lower third. There was no pulsation nor thrill, but foot was edematous and patient complained of a dull pain in lower leg and foot.

Diagnosis: Venous aneurysm, anterior tibial vein.

Operation: November 1, 1918, incision over anterior tibial vein. Small clot of blood removed. Anterior tibial vein ligated at both proximal and distal ends, and sac resected.

Progress: December 1, 1918, small amount of edema in foot after patient walked for a time. January 1, 1919, collateral circulation entirely established. No edema. Patient discharged, cured.

Case V.—Pvt. A, M.D., 28th Inf. Wounded: November 6, 1918. Diagnosis: G. S. W. right knee, penetrating. Entrance outer aspect. Severe. Admitted to Base Hospital No. 11, November 11, 1918.

Debridement wound on inner aspect of right knee healed. November 15, 1918, small mass with expansile pulsation and machine-like bruit noticed for first time. Patient did not complain of pain, but had some stiffness in knee-joint. No disturbance in circulation of leg, but mass increased in size gradually.

Diagnosis: Aneurysm, popliteal artery, right leg. Severe.

Operation: December 9, 1918, clot removed and artery ligated above and below seat of injury.

Progress: December 30, 1918, wound entirely healed, collateral. Circulation fully established. Discharged, cured.

Case VI.—Cpl. W., Co. K, 16th Inf. Wounded: October 4, 1918. Diagnosis: G. S. W. right knee, perforating. Entrance middle of inner aspect one inch above articular surface. Exit external margin of popliteal space. Severe. Admitted to Base Hospital No. 11, October 13, 1918.

November 1, 1918, small mass, about the size of a hen's egg, noticed in right popliteal space. Had expansive pulsation, marked thrill, and a to and fro murmur. Elastic bandage was applied with the idea of assisting clot formation. Pressure was applied for seventeen days with a slight reduction in the size of the mass for the first five days. Mass was increased in size followed by a marked edema of the leg and foot, which were, however, never cold or discolored.

Diagnosis: Arterial venous aneurysm, popliteal artery and vein.

Operation: November 21, 1918, incision over mass. Large sac extending full length of popliteal space and connecting with both artery and vein. Clots removed. Ligation of both ends of artery and vein and communicating branches to sac, which were numbrous. Primary closure.

Progress: November 30, 1918, stitches removed. December 25, 1918, circulation entirely compensated. Patient discharged, cured.

SUMMARY

1. Of the six cases reported, three were arterio-venous, one arterial, one venous, and one diffuse. Of these cases four were discharged cured, one died of meningitis, secondary to compound comminuted fracture of skull (Case II), and one died of shock, following loss of blood at operation (Case I).

2. All vessels involved were ligated following long periods of complete rest, immobilization and pressure over mass.

3. The period of rest, varying from 11 to 62 days (an average of

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33.5 days), was sufficient to allow collateral circulation to become fully established, thereby diminishing the risk of post-operative gangrene.

4. It is essential that all clots be removed, thereby relieving pressure on the remaining vessels and lessening the chances of gangrene from the interference of circulation below.

5. Post-operative treatment is very important: (*a*) The wound should have a large, soft, sterile dressing applied. (*b*) The extremity should be allowed to lie in its natural position. Splints are contra-indicated, as pressure necrosis is apt to occur. (*c*) No hot-water bags should be used, except to warm the bed before the patient is returned from the operating pavilion, as sloughing may occur in those parts of the extremities in which collateral circulation is not fully established. (*d*) If heat is thought necessary to aid the circulation in the extremity, the therapeutic light is advised.

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COMMENTS ON THE ARMY FIELD RATION

By Major CLEON C. MASON
Sanitary Corps, United States Army

IT IS not the writer's intention in this paper to attempt to prescribe a field ration. This has been done by practically every American general, beginning with George Washington, and up to the present it cannot be said that we have found a satisfactory field ration. The writer will briefly discuss some phases of the problem of feeding troops in the field which came under his personal observation while on duty as Nutrition Officer of the 91st Division, U. S. A. During the period of observation this division was in the eighth training area at Montigny-le-Roi, advancing to the front, in combat during the first phase of the Meuse-Argonne offensive, and in the Ypres-Yser offensive in Flanders where the division occupied Audenarde, Belgium, at the time the armistice was signed.

The field ration, as the name implies, is a ration intended to subsist an army in the field. In the war just ended it was rather difficult to draw any sharp line of demarcation between field and garrison, speaking in terms of the ration. In some sectors troops holding front line positions were to all practical purposes living under garrison conditions and could obtain the full garrison ration, while other troops some distance from the front found it difficult to obtain a full ration of any sort. Eventually it was found that the troops lived on two rations, the reserve, which for the time took the place of the field ration, and a ration which was neither field nor garrison, but might be called a "glorified" field ration, or better still, a short garrison ration.

Let it be stated here, that during the entire time this division was in action in France or in Flanders, there never was a single instance of a real lack of food. Through all the divisional movements, and they were many, the Quartermaster Department never failed to deliver to the railhead. There were numerous instances where there appeared to be a lack of good judgment; for example, shipping six-pound cans of corned beef to be used as an emergency ration, or the persistent shipping of canned salmon to troops just out of battle, a time when morale and body are low and the time of all times to see that the troops get the best ration there is to be had, in order to restore the men as quickly as possible. Anyone who has had to subsist on canned salmon for any time will realize how it becomes almost nauseating in a short time. At other times there seemed to be a lack of close coördination between G3 (operations), G. H. Q. and G4 (supplies), G. H. Q. in that the Quartermaster did not receive ample notification of intended movements whereby he could regulate, not only the

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shipments, but the types of food to be furnished. It is quite obvious that the future action of a division should materially affect the character of the food to be shipped to the railhead. When it is known that on a certain date a division will engage the enemy, it is apparent that that division should receive canned foods, meat, vegetables, etc., which can be cooked if conditions permit or which can be eaten without cooking if it becomes necessary, as it often did. And further, it would be extremely unwise to send up that food in six-pound containers, since subsisting under such conditions becomes almost entirely individual, or at the best very small groups. The shipping of frozen meats and fresh vegetables to troops in combat, except those holding trenches, means large financial losses to the government as much of the food cannot be delivered to the soldier. This last did not hold during the fighting in Flanders where good roads and plenty of them permitted of rapid transportation to the combat kitchens. In justice it must be said that the Quartermaster Department always functioned.

Once delivered to the railhead the problem of the ration became divisional; it was then a question of equalizing the days supplies and making the deliveries. Sometimes this was simple, again it presented many difficulties. When there was a plentiful supply of transportation, the roads good, and conditions which permitted of daylight movements, the division fared well; but, and this was often the case, when there was a shortage of trucks, when the roads were not only pitted but subject to constant shell fire, and the deliveries had to be made at night the problem became quite complex. Under such circumstances isolated units would often have to subsist on the reserve ration, and any one who has seen the American soldier throw away his two days reserve while marching, or the avidity with which he will eat the whole thing for lunch the first day, will appreciate the fact that these units fared rather poorly when the necessity arose.

The division also had to handle the problem of the proper preparation of the food. Good, wholesome supplies can be quickly rendered uneatable in the hands of a poor kitchen personnel; on the other hand food of a rather low quality can be made highly palatable. In the future it is greatly to be desired that more and more attention be paid to the training of cooks and mess sergeants, not forgetting that every officer who commands an organization must also have a practical working knowledge of the functioning of a kitchen. With this end in view, cooks and mess sergeants should be trained to get the greatest variety out of the simplest components. Time and again it was recommended that troops in the training camps in America be subsisted on the ration in kind. This policy was not generally adopted with the result that kitchen per-

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sonnel who were accustomed to well equipped kitchens, and abundance of raw foods of all varieties were almost lost when required to use the field range in the open, a limited variety of food, and poor equipment. It is little wonder that stew became the stock dish. It is all well enough to teach an army how to live in garrison, but if that army is to subsist in the field with any dietetic comfort it must be given some field training and some knowledge of the conditions to be faced as far as food is concerned.

It can be gathered from the above statements that the problem of the field ration has different aspects; first, physiological; second, psychological; and third, practical. This division is not absolute, since each phase must of necessity ramify in the others. The ideal field ration must satisfy the demands of each of the three divisions, that is, it must be a ration which will meet all the physiological needs of the body, with no great excess which would only become a burden on the transportation and a financial loss; a ration which is always pleasing to the soldier's palate, an obviously unattainable ideal; and a ration which keeps well, is packed well, and is readily transported.

Physiologically it is comparatively easy to lay down a ration. From the most recent studies available, those made by the Department of Food and Nutrition, Surgeon General's office, U. S. Army, on soldiers in all the large American camps it was found that under all conditions, weather, work, etc., the average daily per capita consumption of food energy was between 3,600 and 3,700 calories with a distribution of 13 per cent protein, 18 per cent fat, and 69 per cent carbohydrate. Using these figures as a basis, it follows that to meet the demands of the average soldier the ration must deliver not less than 3,600 calories, or allowing for unavoidable losses it should contain in gross about 4,000 calories with an elemental distribution approximating the 13, 18, 69 ratio given above. Because of its high heat value per unit of weight it might be well to increase the number of fat calories to perhaps 25 per cent with a relative decrease in the other elements. This fact accounts for the advocacy, by most men long trained in field work with troops, of bacon as a regular component of a field ration. Bacon delivers about 200 calories per ounce, contains about 10 per cent protein, and is one of the most concentrated foods. It has the further advantage of keeping well, being easily transported, easily prepared, and as a regular food the troops will eat it longer than any other form of meat without complaining.

Hardbread, like bacon, is classed as a concentrated food, having an energy value of about 100 calories per ounce, 10 per cent being a good grade of protein. Hardbread, to be satisfactory in the field, must be in tin or some equally protective container which will guard against the wear

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and tear of the elements and transportation, and when once in the hands of the soldier, from nibbling.

By using 16 ounces of hardbread and 10 ounces of bacon it is possible to give the soldier 90 grams of protein with 3,600 calories per day, and with a total weight of only one and three-quarters pounds, whereas the garrison ration, delivering about 4,400 calories, weighs approximately four and one-half pounds. The lack of bulk in the bacon-hardbread ration is to a great degree offset by the relatively high fat content, as the ingestion of fats materially retards digestion and greatly prolongs the sense of fulness.

The possibility of getting a ration which is too salty should be carefully considered, as an excess of salt will inevitably lead to a high water consumption, and when an army is operating in a new country without complete knowledge of water sources, the practice of drinking at every well or spring becomes a dangerous one. For this reason corned beef, with its high salt content, should be used rather sparingly in the field.

In general the physiological problems of a field ration are not difficult. It is only when one considers the physiological questions in their relation to the very important practical considerations involved that the real complexity of the situation becomes apparent.

The question of the psychology of the ration is equally, if not more important than that of the physiology. From watching troops under all conditions of warfare, in fact, watching the same organizations from their induction into the service to the armistice, the writer has become firmly convinced that no other single factor plays so important a role in the maintaining or destroying of army morale as food. This is especially true in an army composed of civilians as our army was. Much care and thought has been given to maintaining the physical condition of the soldier. He is vaccinated, innoculated, regularly examined, and carefully trained physically. At the same time, during the training period, ample amusement in the form of games, motion pictures, theatrical performances, and reading is supplied. At such periods the food is usually good, and quite naturally the important part it will play in maintaining morale is overlooked. Later, in advance rest areas, field operations, or combat, where it is impossible to furnish the soldiers with amusements, food becomes an almost vital factor in more ways than dietetic. For this reason, if the ration is to fulfill its function completely, it must serve not only the body needs of the soldier but must satisfy the palate as well.

The average division spends a comparatively small amount of its total time in the field in combat. There are periods of advance to front line sectors, usually a trying ordeal to every division fresh from a training area, being, as it were, a tryout of all the divisional machinery. There are

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periods of engaging the enemy when the soldier faces all the nerve racking ordeals of war. There are periods when withdrawal to advance rest areas is under way, followed by a period of rest. Beyond certain points the advancing troops meet shell-fire and the same is true when troops are withdrawing, while some of the advance rest areas were never free from harassing night bombing by aviators. This more or less continual fire from the enemy has, quite naturally, a disturbing effect on the general troop morale. At such a time it is the writer's opinion and experience that the strongest weapon in the hand of organization commanders is food. During three months of duty with an active division it was always possible to determine the strong and the weak organizations by simply visiting the kitchens. The kitchen mirrors with unerring accuracy not only the ability of the commander but the quality of the men. And this problem of food cannot be entirely controlled by the officer in charge. The Staff of General Headquarters must have a full appreciation of the situation at the front, a willingness to meet every reasonable request from the combat divisions, and should give careful attention to the character and variety of the food which is going forward.

Some items should always reach the fighting soldier, even at the cost of other components of recognized value. Candy of any sort, if it is available, should go to these troops at all times. It is quite remarkable to see the influence of candy on a division which has subsisted on coffee, frozen beef, low grade war bread and potatoes. Another item is tobacco. While the amount is small still it is enough to keep the soldier well contented for the time. In combat divisions neither the sales commissary nor the welfare organizations can be relied upon and these two articles are always in demand.

From the foregoing it is seen that the problem of meeting the physiological demands of a good diet is not hard, nor is it hard to keep the soldier contented with his food, provided the practical questions involved can be solved. A sufficient quantity of well-cooked, palatable food, with some candy and a little tobacco answers both demands.

The present war has been, to a large extent, one of transportation, victory falling to the side with the most trucks. The question of feeding troops becomes eventually a question of transportation and any attempt to build a satisfactory field ration must also be an attempt to solve the transportation problems. Not only must the ration be as light as possible, it must be so packed that it is adaptable to transportation. This means that food containers have to be considered. Large quantities of hardbread were ruined, due to the fact that it was not in weatherproof containers, nor did the containers dipped in paraffin help any for the wax covering cracked as soon as it was cold, and water entered the package

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as readily as before. This matter of containers presents a number of problems, quite as important as the question of what they shall contain. (1) What is the best shape for the container? (2) What size shall the container be? (3) Of what material shall the container be made? Shape, size, and material, further, bear quite important relations to the transportation available and to the type of pack in use. As to material, up to the present nothing better than tin has been found. Fiber may be developed in the future, but at present tin is superior in spite of certain disadvantages. As to shape, the square container certainly packs more readily, but square containers were impossible to obtain in any quantity due to the uniform use of the round can in America. There is a field for considerable experimental work on this subject of the container in relation to the soldier's pack. As a matter of fact the pack itself will stand a good deal of critical study with a view to improvement.

During active campaigning the following ration was carried by a number of officers including the writer, and while not used as a continued diet, still it did furnish a large number of meals and was used enough in the aggregate to be thoroughly tried:

Two 1-pound tins of hardbread.
Two 11-ounce tins of baked beans.
One meat can of sliced bacon (1½ pounds)
One condiment can:
compartment *a* crushed soup cubes.
compartment *b* soluble coffee and sugar mixed.

In a real emergency this ration, with the exception of the soup cubes, will deliver its full fuel value without cooking, and in a fairly palatable form. If fires can be used it offers an endless variety of ways of preparation. This ration will give the following energy values:

	Calories
Bread	3,594
Beans	820
Bacon	4,858
Sugar, 3 oz.	348
Total	9,620 or 4810 calories per day.

The protein content of the ration is 186 grams or 93 grams per day. This gives a diet with 84 grams of protein and 4,810 calories, ample for any person. The fat content of the ration, while quite high, is more apparent than real, for in the cooking a considerable portion will be lost and with this loss in fat there will be an actual decrease in caloric value and a relative increase of protein and carbohydrate.

This ration is not proposed for adoption, but given as one which was personally found satisfactory. After all is said and done, the laying down

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of a satisfactory field ration cannot be done in an office or a laboratory miles from the organization to be fed, nor can a ration as laid down in Regulations always suit all field conditions. The field ration must be a highly flexible arrangement based on intelligent reports from the organization by some officer especially qualified to advise regarding the needs after he knows the transportation situation, the climatic conditions, the character of future movements, the dietary habits of the command, and the status of local food supplies. Further there must be a close coöperation by those in charge in the rear on the assumption that the officer with a combat division probably knows more about existing conditions forward than the supply officer in the rear.

If divisional nutrition officers could be advised from time to time regarding available supplies, time required for shipment, and if the supply officers would, as far as possible, comply with the requests of these officers there seems no reason why a division in the field should not subsist on a ration which is entirely correct.

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THE TREATMENT OF CATARRHAL DEAFNESS

By PHILIP RICE, M.D., F.A.C.S.
Late Captain, Medical Corps, United States Army

THE problem of catarrhal deafness is one of increasing embarrassment and seriousness to the aural specialist in the army medical service. Not only is the number of the actual deaf very large, but the number of those with strong predisposition to deafness, which predisposition requires only a little of the exposure of a soldier's life to become activated, is still greater. For both classes the aurist has at present little encouragement to offer. While he has made splendid progress in many departments of his work, in this particular one he stands quite where he did a generation or more ago. Morbid processes which twenty-five years ago were exceedingly baffling problems are today simple affairs; catarrhal deafness, however, remains a riddle to most of us.

For this, several explanations might be offered and a discussion of these would be both interesting and profitable, but time will not permit. Let us turn at once to the subject of the treatment of this intractable condition. Let us begin by asking ourselves the question: What is essentially required in order that a treatment be successful? In other words, what are the fundamental lesions to be overcome? When we have answered these questions, then, I think, we will not only have accounted for our failure to progress and our failure to cure, but we shall be on the highroad to better things.

The various pathological conditions need not be discussed in an extensive way. Suffice it to say that each, when carefully traced, will be found to have its origin in one or more of four fundamental states, namely, deficient nutrition, engorgement of the deeper tissues, anchylosis of the ossicular chain, and tubal occlusion. Atrophy, hyperplasia, sclerosis, etc., are all part and parcel of these fundamental states, variously modified in different individuals, of course, but part of them. Hence, when we come to the matter of the treatment, these modifications require no special consideration; the treatment which will reach the root of the trouble will likewise reach them.

These are very general heads, to be sure, and not the usual and academic classification. Nevertheless, for our present purpose they will serve better than any other. What we are after is a reasonable and practical foundation on which to rest a method of treatment. It must be clear when we have brought the nutrition up to normal, overcome a tubal occlusion, reestablished a normal relation between aerial conduction, and bone conduction, broken up an anchylosis, that an improve-

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ment in the hearing must of necessity follow. And this is, after all, our only goal.

This view of the problem compels us to extend the scope of our therapeutics beyond that which aurists generally observe. This means that we must give attention to the state of the general nutrition. The nutrition of the middle ear can never be normal while the general nutritive processes are below normal. My observation and experience lead me now to take into very careful consideration the state of the abdominal functions in every case. Deficient function on the part of the abdominal organs results in sluggish general circulation, mucous membrane engorgement and a host of other conditions which, if not the direct precursor of middle ear catarrh, are sure to contribute generously to this or whatever other morbid process may be going on in the tympanum. The importance of this, I believe, has been overlooked by aurists, or at least not sufficiently heeded.

What amounts to practically the same thing as the subject of the general nutrition is that of the general circulation. Engorgement of the membranous lining of the Eustachian tube can never be corrected with mere inflation or any other local measure while there is a sluggish circulation accompanied by engorgement of the mucous membranes generally. We have wisely given more attention in recent times to abnormalities in the upper respiratory tract in our efforts to cure deafness, but it is doubtful if we realize the importance of extending these corrective measures and taking into account factors which, though more distantly located, are nevertheless just as directly related to the middle ear.

However, it is not the aim in this brief article to cover the entire subject of the treatment of catarrhal deafness. I desire more particularly to bring to the attention of the medical profession an instrument which was constructed for me some years ago aimed to reach and correct the four fundamental defects above mentioned. After nine years of experience with it in several hundred cases, I am happy to say that I now undertake the treatment of catarrhal deafness with as much confidence of success as it is possible for a physician to have in the treatment of much simpler conditions.

This instrument, which I have named Concusso-Masseur, consists of a magnetic coil in the center of which is a movable core which, when energized, moves up and down at the rate of about 3,500 per minute. As it comes down it strikes a flexible brass diaphragm over an airtight compartment, the result being a sharp concussion vibration. The effect, it will be seen, is entirely vibratory. Let me hasten to say, however, that this effect is in no way similar to that produced by the instruments constructed on the principle of the Delstanche masseur.

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The effect of the Concusso-Masseur is that of a pure concussion, whereas that produced by the other instruments is pressure and suction. The effect of the former is stimulating, clearly desirable; of the latter, by their pressure and suction action, is devitalizing. The former is followed by hyperemia and an improved tone, the latter by relaxation, stasis and a lowered tone.

A treatment consists of a five or six minutes application of the vibrations through the Eustachian catheter and about two minutes through the external auditory canal, varying the time according to the nature of the case. Thus it will be seen that a treatment means the application of from 18,000 to 20,000 mild but sharp concussions to the auditory apparatus. Experience leads me to urge daily treatments. Far better results are thus obtained and in less time. It is clear, if we can maintain an active hyperemia for an hour or more daily, more is accomplished in a reconstructive way than if we can do this every two or three days only; there is less going back between treatments.

The aim of this method is directed at the most essential factor, namely, the circulation. Whenever we are able to raise this up to normal—indeed, raise it above normal in the beginning—there follows a revitalization of the histologic elements, a resorption of waste materials deposited in the tissues, a reduction of tissue engorgement, and finally a softening and breaking up of adhesions with accompanying increased suppleness of the auditory apparatus.

That the methods generally employed—and these have been the methods of treatment in use for a generation or more—do not and cannot achieve these results is proved by our skepticism and our pessimism. This quite universal state of mind would not exist today had these old-time methods been more fruitful of good results. Viewing the process of catarrhal deafness in this way, which, it must be admitted, is less technical than the way in which it is usually viewed, it is not difficult to see what folly the usual routine measures are. How foolish to try and overcome a tubal obstruction with mere inflation when the cause of the engorgement is the result of a general circulation that is below par, or to think that a few puffs of air every day or two will dissipate a congestion of the deeper tissues, as shown by the increased bone conduction. Yet how persistent and serious we have been in the application of this effort in such conditions. Again, we have never stopped to think that because of the disturbed nutrition there was in the drumhead a decided atrophic tendency and that in consequence the application of the instruments constructed on the principle of the Delstanche masseur resulted in the stretching of the membrane with consequent relaxation and aggravation of the deafness. What folly—indeed, how unscientific—is such a procedure!

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The secret of success in the use of the Concusso-Masseur lies very largely in the proper use of the Eustachian catheter. Too great emphasis cannot be placed on this point. Unless the instrument lies in such position that the vibrations are sent directly into the tube and made to penetrate and be distinctly heard with the diagnostic tube, our efforts are largely if not altogether wasted. To be able to hear the inflation sounds is no proof that such an adjustment has been achieved. An air current backed up with 20 to 30 pounds pressure can be made to penetrate and be quite distinctly heard though it has to travel a tortuous course. With the milder vibrations of this instrument this is not the case. Here a perfect adjustment must be had. The direction of the beak of the catheter must be in direct line with the axis of the tube, and its tip must be in perfect apposition with the mouth of the tube, otherwise the desired effect is not obtained. A slight addition of air pressure is required in those cases where an obstruction exists. When the tube is open the vibrations are clearly heard without the extra pressure, providing the catheter is in proper position.

During eight months' service at Camp Fremont, Fort Snelling and Letterman General Hospital, an average of 25 cases were treated daily. The following are a few of the more typical. They furnish a fairly good basis on which to judge the merits of the instrument and method used in the treatment.

Case I.—December 30, 1918. Pvt. W. M., Med. Det.

O. M. C. C. since early childhood. Marked susceptibility to climatic changes. With each change of temperature aggravation of the catarrhal condition, especially the ear symptoms. Numerous attacks of O. M. C. A. durg his years. Drumsheads thick, retracted, lusterless. Eustachian tubes occluded, efpecially the right.

Nose.—Hyperplastic rhinitis, worse on the right side. A large nodule near posterior extremity of inferior turbinate, causing obstruction and making catheterization very difficult.

Throat.—General hyperemia. Tonsils moderately large.

Weber equal. Rinne with C, right minus 20, left minus 15. Rinne with C3, right minus 5, left minus 5. Hearing for watch, right contact, left contact. Hearing for whisper, right 6 inches, left 6 inches.

Daily treatments up to March 1, 1919, resulted in: Weber equal. Rinne with C, right minus 10, left minus 7. Rinne with C3, right plus 7, left plus 7. Hearing for watch, right 28/40, left 40/40. Hearing for whisper, right 18/20, left 20/20. Eustachian tubes well open and drumheads clearing.

Though the hearing is practically normal the prognosis is not altogether favorable owing to the fact that Rinne remains minus for the C fork. This shows an abnormal density of the deeper tissues, and this always means easy relapse.

Case II.—January 4, 1919. Pvt. R. Z., S. A. T. C.

O. M. P. A. accompanying epidemic influenza in November, 1918, involving the right only. Perforation in Shrapnell's membrane posterior to processus brevis. Through this protrudes a bleeding granular mass. Free flow of thick, yellow pus.

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Drumhead red, thick, retracted and adherent. Eustachian tube occluded. Loud rales on inflation.

Nose.—Membrane slightly reddened, otherwise negative.

Throat.—Negative.

Weber right. Rinne with C minus 20. Rinne with C3 minus 10. Hearing for watch, contact. Hearing for whisper, 5/20.

Daily treatments up to January 30 resulted in: Weber only slightly to the right. Rinne with C plus 25. Rinne with C3 plus 25. Hearing for watch, 40/40. Hearing for whisper, 20/20. Ear dry, some retraction, periphery of drumhead slightly red, perforation nearly closed. Eustachian tube open and clear.

Case III.—January 7, 1919. Lieut. A. H. Y., M. G. Co., 127th Infantry.

Labyrinth concussion received in action on July 31, 1918. Unconscious for twelve hours. For a number of days thereafter mind was dull and orientation difficult. Complete loss of hearing in both ears except for the loud voice spoken directly into the ears.

Condition on entrance to my clinic was as follows: Drumheads retracted, lusterless. Eustachian tubes moderately open.

Weber equal. Rinne with C plus 10, left plus 10. Rinne with C3 plus 5, left plus 5. Hearing for watch, right 3/40, left 3/40. Hearing for whisper, right 6 inches, left 6 inches. Hearing for voice, right 2 feet, left 2 feet.

February 24, after 30 treatments: Weber equal. Rinne with C right plus 10, left plus 15. Rinne with C3, right plus 10, left plus 10. Hearing for watch, right 10/40, left 18/40. Hearing for whisper, right 2/20, left 4/20. Hearing for voice, right 15 feet, left 15 feet.

Case IV.—January 25, 1919. Lieut. M. V. T., Co. G, 355th Infantry.

O. M. P. A. in right in early childhood. Gunshot wound causing compound fracture of right mastoid process on November 8, 1918. Fullness and pressure in right ear has been constant ever since, with marked defect in the hearing. Right drumhead thin, retracted, calcareous deposit in posterior inferior quadrant. Left, dull white and slightly retracted. Right Eustachian tube occluded. Left open.

Nose and *throat*, negative.

Weber right. Rinne with C, right plus 5, left plus 10. Rinne with C3, right plus 10, left plus 15. Hearing for watch, right 6/40, left 18/40. Hearing for whisper, right 6/20, left 15/20.

Daily treatments up to February 8 resulted in: Weber equal. Rinne with C, right plus 10, left plus 15. Rinne with C3, right plus 20, left plus 25. Hearing for watch, right 40/40, left 40/40. Hearing for whisper, right 20/20, left 20/00.

Case V.—February 2, 1919. Pvt. W. McD., Co. H, 307th Infantry.

O. M. P. A. in right in childhood. Several months ago suppuration recurred following exposure to severe cold. Discharge lasted several weeks. Hearing has been defective since. Drumhead dull, retracted, adherent, cicatrix in posterior-inferior quadrant.

Nose and *Throat*, negative.

Weber right. Rinne with C minus 10. Rinne with C3 plus 20. Hearing for watch 20/40. Hearing for whisper 15/20.

Daily treatments up to February 8 resulted in: Weber equal. Rinne with C plus 18. Rinne with C3 plus 30. Hearing for watch 40/40. Hearing for whisper 20/20.

Case VI.—February 7, 1919. Pvt. C. C., Co. L, 360th Engineers.

O. M. P. C. biaural, for past eleven years. Exceedingly foul pus. Right drum-

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head thick, red, retracted, adherent, large perforation in Shrapnell's membrane anterior to processus brevis. Left entirely destroyed below umbo. The remaining portion thick, red, retracted and adherent. Eustachian tubes well open.

Nose.—Simple chronic rhinitis; excessive discharge and post-nasal dropping.

Throat.—Uniform redness and puffiness of membranes.

Weber left. Rinne with C, right minus 10, left minus 18. Rinne with C3, right plus 5, left equal. Hearing for watch right 12/40 left 15/40. Hearing for whisper right 8/20, left 10/20.

Daily treatments up to March 7, resulted in: Weber equal. Rinne with C, right equal, left equal. Rinne with C3, right plus 10, left plus 10. Hearing for watch, right 24/40, left 30/40. Hearing for whisper, right 20/20, left 20/20. Right still discharging foul pus though not so freely. Left ear dry, drumhead clearing. Inner wall of middle ear less inflamed.

Case VII.—February 12, 1919. Pvt. A. C. K., Medical Detachment.

O. M. C. C. extending over a period of a number of years. Marked aggravation of the trouble during the winter months. Biaural O. M. P. A. in December, 1918. Marked defect in the hearing following this attack. Both drumheads thick, dull, retracted, adherent, cicatrix in each. Eustachian tubes occluded; loud râles on inflation.

Nose.—Septal spur on right side. General congestion of membrane. Excessive mucous secretion.

Weber left. Rinne with C, right minus 20, left minus 15. Rinne with C3, right equal, left equal. Hearing for watch, right contact, left contact. Hearing for whisper, right 2/20, left 2/20.

Daily treatments up to February 24 resulted in: Weber equal. Rinne with C, right plus 18, left plus 15. Rinne with C3, right plus 25, left plus 18. Hearing for watch, right 40/40, left 40/40. Hearing for whisper, right 20/20, left 20/20. Eustachian tubes clear and open. Drumheads clearing.

Case VIII.—March 2, 1919. Lieut. D. McD., Medical Corps.

Biaural O. M. C. C. of years standing. Epidemic influenza in November, 1918, which greatly aggravated the trouble. Drumheads present the usual signs of O. M. C. C. Eustachian only moderately open. Constant tinnitus, very distressing at night.

Nose.—Membrane dry, irritable with slight crusting on right side of septum.

Throat, negative.

Weber equal. Rinne with C, right minus 20, left 18. Rinne with C3, right plus 5, left equal. Hearing for watch, right 13/40, left 8/40. Hearing for whisper, right 10/20, left 6/20.

Daily treatments up to March 22 resulted in: Weber equal. Rinne with C, right minus 8, left minus 12. Rinne with C3, right plus 15, left plus 15. Hearing for watch, right 30/40, left 24/40. Hearing for whisper, right 18/20, left 15/20. Tinnitus only occasionally and then not severe.

Case IX.—March 6, 1919. Pvt. W. G., Co. G, 125th Infantry.

Tinnitus and defective hearing following labyrinth concussion received in action.

August 8, 1918.—Drumheads show signs of O. M. C. C., but patient declares never having had trouble with his ears. Tuning fork tests uncertain owing to the tinnitus. Eustachian tubes moderately occluded.

Nose and *Throat*, negative.

Hearing for watch, right 20/40, left 16/40. Hearing for whisper, right 12/20, left 12/20.

Daily treatments up to March 23 resulted in: Tinnitus unchanged. Hearing for watch, right 40/40, left 40/40. Hearing for whisper, right 20/20, left 20/20.

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MILITARY HYGIENE

By A. L. BENEDICT, A.M., M.D., F.A.C.P.

SANITATION, including sanitary engineering and amynology (usually mistermed "immunology") will be considered only incidentally, attention being given mainly to personal hygiene in its minor details. While originally appointed for gastro-enterologic service, the writer's experience was of a general medical nature, covering six stations.

The fact that impressed the writer most was the considerable morbidity of young male adults, contrary to the general conception of their relative resistance and in spite of:

1. The initial elimination of about 30 per cent of draftees for physical reasons and the further, quite prompt elimination of about 1 per cent for neuropathic reasons, 1 per cent for tuberculosis in the military sense, and of still others for various defects discovered or developing after enlistment, or the radical cure of various conditions such as hernia, chronic appendix inflammation and orthopedic defects.

2. Conditions usually considered as favoring health, such as outdoor life, physical exercise, early and regular if somewhat lengthy hours of labor, plain, abundant and usually quite good food, reduction of tea and coffee, almost complete elimination of alcohol and a use of tobacco that was very moderate, especially because mostly in the form of cigarettes, contrary to the common prejudice.

3. Efficient sanitary and amynologic procedures, prevention and cure of venereal diseases and general safeguards against infections in general.

In civil life, a medical clientele, including both sexes and all ages, of 600 in the recent past up to 700 at present, involves serious economic problems depending on relative lack of employment. In the Army the regimental or rather battalion assignment of surgeons corresponded to just about this clientele, to attend to trivial conditions or to render first aid for major conditions. The total provision of surgeons corresponded to a clientele of about 120, and of captains and lieutenants who were mainly the active practitioners of the Army to a clientele of about 200. In general these men were much busier than in civil life, and many were excessively so, at least for considerable periods, even excluding the direct effects of the influenza (?) epidemic. The difference cannot be entirely explained by paper work, routine attention to trivial conditions usually ignored in civil life, or even by the repeated precautionary physical examinations before and after change of stations and otherwise, as these were simply additions to the normal high standard of work required.

From another standpoint, even allowing for the necessary freer use

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of hospital facilities, one would hardly expect a civilian community of both sexes and all ages equivalent to a division or other post of 20,000 to 30,000 troops, to have from 300 to 800 persons in a hospital (not considering the epidemic of 1918 nor the front), and to require a large hospital staff (30 to 75), including consultants, in addition to the routine regimental surgeons corresponding to the general practitioners. When we consider how largely a civilian hospital depends on obstetric, gynecologic and pediatric cases and those of either medical or surgical nature due to senility in the broad sense and the extent to which it serves outlying population, the susceptibility of young male adults is still clearer.

So far as could be observed, the disease incidence was not due to the inclusion, as among Regular Army and National Guard troops, of men beyond the draft age. In fact, even among medical officers, it seemed that the general resistance of the older men was greater than that of the younger, with the sole exception of fatigue due to unusually severe physical exercise for which, of course, very few of the older men but many of the younger were fitted by recent engagement in athletics.

A corollary hygienic paradox is that the supposed benefits of outdoor life, at least so far as they represent a decided change of habits, have been exaggerated. This general statement was supported by quite diverse observations. For example, even discounting the danger of fire and the loss of efficiency from the long distances between buildings to diminish this danger, the discomforts and interference with diagnostic and therapeutic methods due to the occupation of wards before their completion, the danger of lodgement of bacteria on rough surfaces, etc., convenience in regard to transportation of patients and supplies, comfort of the staff, etc., the personal opinion was formed that, at least for hospitals, solidly constructed buildings of almost any kind should, in the event of a future military emergency, be commandeered in cities near camps instead of following the temporary construction adopted in the late war.

It was also observed that, whether in hospital wards, barracks or tents, excessive ventilation tended to its over-correction, while, even in summer, the air might become foul, especially with over-crowding, as often occurred.

Even healthy men in winter craved diffuse indoor warmth, the need being supplied almost entirely by extra-military philanthropic organizations.

The open-air or verandah treatment of pneumonia, etc., was usually justified. The general opinion of the profession and laity that exanthems are liable to complications—or to being "driven in," as the laity express it—by chilling, did not seem to be supported. However, in

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cold, damp weather, in extreme cases of pneumonia, etc., with accumulation of secretions, the writer is old-fashioned enough to plead for the luxury of dying in a warm room and even to believe that dry, diffuse warm air, allowing more general evaporation and emanation from the skin and favoring expectoration, might actually be life-saving. However, this attitude is largely due to the sad experience, as officer of the day, of four deaths under such circumstances in one night and the danger of being unduly impressed by definite experiences and coincidences is obvious.

One fact should be squarely faced, and it is one regarding which the writer has for many years experienced difficulty in dealing with patients over-impressed with the advantages of climate. With a few local exceptions such as Death Valley, not to be considered in strategy and military mobilization, there is no place in the United States where the matter of winter cold can be entirely ignored.

In spite of their undoubted infectiousness, diseases that could in any way be regarded as "colds" according to the old view, even including the pneumonias, measles, diphtheria, and influenza, either diagnosed clinically or bacteriologically in 1917–18 and the so-called influenza of 1918–19, corresponded in their maximum incidence to the cold season and to such climatic periods as the older critical though empiric observation had associated with similar conditions in the past. It should be remembered that this observation did not apply to continued, dry cold, but to fluctuations of temperature and the association of humidity. Undoubtedly, so far as minor local epidemics were concerned, cold was a factor largely on account of efforts to keep warm at the expense of ventilation and consequent contagion. However, it must be admitted that neither dust nor insects in warm weather produced the results of cold weather as a crude initial cause.

A particularly important source of colds was, as has long been known, chilling after perspiring. The military authorities soon recognized this fact and regulated the dress for drills accordingly, cautioned drillmasters not to keep men standing outdoors after drills, ordered change to dry underwear, and otherwise reduced this factor to a minimum. The routine wearing of blouses (coats) in overseas service seems to have been largely a matter of military esthetics, though partly due to a confusion of parallels of latitude with isotherms.

The exanthemata and, to some extent, other infections, especially those usually considered semelincident, occurred to a considerably greater degree among troops from the country. So far as the writer is aware, no concerted effort was made to determine, from military experience, the truth of the old conception of semelincidence, how far

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exceptions are due to the expected failure of any general law and how far they are merely apparent and explained by incorrect histories or numbers of other human beings is due to active immunity, accidental previous or present diagnoses. It remains an open question, and one whose importance is not fully recognized, how far the conception of semelincidence is correct and whether, indeed, it represents anything more than a quantitative difference in immunity such as persists for a time after any infection. It has been implied rather than explicitly stated that the logical immunity of men constantly in contact with large but greatly increased by the law of chance according to the number of exposures, without actual development of any particular infection at any time. This is another important point on which we should not be biased by implications or general impressions and which ought to be established. It should be remembered that we are densely ignorant of the essential cause of the exanthemata. Practically all physicians would regard as absurd the contention that these diseases are, wholly or in part, different clinical manifestations of the same infection or of other infections not regarded as exanthematous; that there is no near approach to semelincidence but that the same person has repeated attacks of an infection, at one time diagnosed as scarlet fever, at another as measles, again as German measles or as some skin affection; that, occasionally, there is a repetition of the disease in the same clinical form, usually interpreted as a rare exception to the law of semelincidence. Yet it would be difficult to argue on a scientific basis against such an extreme view nor is the latter essentially more absurd than the general reaction against the quondam acceptance of a "fourth disease."

Military experience has probably popularized the conception that the so-called children's diseases are such only because any disease or any other experience which is extremely likely to involve any human being will, by the law of chance, occur early in life. Even physicians are prone to forget that smallpox, until well controlled by vaccination and rendered so rare that only adults would usually come in contact with it, was just as much a children's disease as scarlet fever or measles. In particular, the childish idea that there is anything unmanly in contracting a so-called children's disease has almost disappeared.

Two prevalent ideas about the exanthems seem to have been disproved by military experience: that they are exceptionally severe in adults and that they are, to any specific degree, rendered more dangerous by exposure to cold.

Whether the various methods of attacking the venereal problem—root, branch and soil—are applicable to civil life is an open question. Some have gone so far as to raise the ethical question as to the pro-

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priety of a free country introducing coercive measures even to accomplish a moral purpose, in regard to sexuality, alcoholic indulgence or anything else. Very few Americans realize how much zerothermia there is about our personal liberty. No densely populated country can give more than about so much freedom of individual action and, as a matter of fact, at the time the war began in Europe, the United States gave considerably less than most other civilized countries, whatever their form of government.

The somewhat cynical opinion may be expressed that a considerable degree of the ultimate, supposedly moral factor in the low venereal incidence of the Army was due to the fact that the soldier was too busy, too tired and too depressed by discipline to be excessively amorous. Anaphrodisiac medication by way of coffee was frequently charged, but the more conservative opinion was that this beverage represented a sin of omission rather than commission.

Post facto prophylaxis of venereal infections—really abortive treatment—proved itself a valuable aid, not to be set aside as itself immoral. Its failures were largely due to the perfunctory way in which it was accepted, and it is difficult to see how such failures can be prevented. Some men reported just often enough to escape the results of court-martial if infected by intermediate exposures, others near the time limit of efficiency, while others avoided it as a discourtesy to their female companions.

The pessimistic view held by many physicians as to the therapeutics of veneral diseases was disproved by statistics.

It would be a very low viewpoint, however, which does not enable one to discern that the low military incidence of venereal infections was largely due to a high moral tone and to a high degree of patriotism to keep oneself fit for service, even in the absence of abstract sexual morality.

The psychic depression of military discipline manifested itself in many ways apart from the venereal problem. How far the ordinary standards of personal association in a democratic country must be changed for military purposes and the degree to which the Regular Army objection to the National Guard depended on fighting qualities and adaptability to actual military work need not be discussed here. The fact remains that, quite aside from the physical fatigue of the military work itself, the majority of men from civil life, whether privates or officers, were depressed or irritated by military discipline itself. Early in the war, quite a good many medical officers felt that, if long continued, the psychic strain plus the actual excess of work over civilian standards would cause a general demoralization and that the psychic condition of the soldier

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would reduce his fighting value. Fortunately this apprehension was not fulfilled. It may even be doubted whether its nonfulfillment was due to the comparatively short duration of the actual hostilities for this country or to the relaxation of discipline overseas which is generally admitted. Probably the average human being can adapt himself to such a change of status as well as to purely physical differences in environment.

Almost unanimously, though for the most part good-naturedly, there was complaint directed not so much at the long hours of work and the actual stress of the work itself as at the period of the 24-hour cycle in which it was done. The writer confesses himself fully sympathetic with this complaint. Getting up early was, both in anticipation and realization, the worst horror of war up to the actual front. Why this is so, why large numbers of the people should, after artificially—one might almost say fraudulently—securing the delights of evening daylight belonging naturally to higher latitudes, demand legislation to set the clocks forward instead of rationally and individually starting their day at an honestly early hour is a puzzling fact.

A personal confession of a less general and apparently rather uncommon psychic state may also be made. A moderate degree of discomfort was experienced, as had been noted occasionally in civil life, merely from the fact of being in the country. The most pleasant, though really the hardest service of the writer was in New York City. Literature abounds with allusions to and dissertations on the psychic benefits of more or less uninhabited areas. Personally, exactly the opposite holds good, though not to the exclusion of an enjoyment of natural beauties and phenomena for a reasonably brief period. While this preference has never manifested itself in any extreme degree, it suggests that there may be encountered distinct philias and phobias with regard to city and country life.

Nostalgia is a recognized condition, even in military medical nomenclature, which seems to the surgeon recently from civil practice reluctant to let him call a disease by the diagnostic term which he would naturally use. The writer happened never to encounter nor even hear of a definite case of pathologic homesickness. Moderate degrees were, of course, common and usually frankly admitted. The wholesome disposition to share perfectly laudable attachments to families and home interests generally probably prevented the development of neurotic degrees of nostalgia.

Clothing.—Generally speaking, the uniform was nearly ideal as to comfort, against either cold or heat, durable, easily kept presentable, economic and convenient in regard to rapidity of dressing. Exceptions were mainly due to misfits, occasional poor quality and arbitrary orders

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as to the exact uniform to be worn, applying rather to enlisted men than officers. Without being qualified to speak of service in the trenches or outdoors in bad weather (excepting ordinary cold spells and rain in training camp), the writer found no need to use woolen socks or underwear or any of the special knitted goods. In view of the enormous expenditure of time and the economic disturbances dependent on the production of sweaters by patriotic women, the question may be raised whether they were really superior to ordinary underwear. The writer found the most satisfactory solution of the problem of undergarments to be thin cotton pajamas for hot weather, flannelette pajamas for cool weather, and the same over heavy cotton shirt and drawers for cold weather.

While rubber boots were at times necessary, they are obviously ill-adapted to marching, and a strictly waterproof leather shoe that can be used for dress purposes seems to be a myth. Leather boots are expensive and heavy, little better than shoes for mud, and, indeed, seem to be needed mainly because properly associated with spurs, whose usefulness on parade and at dances is indisputable. The sensible solution of the problem of footwear would seem to be the official recognition of the rubber storm overshoe for moderate degrees of rain and mud and the development of a light, waterproof device somewhat resembling an arctic rubber.

The canvas legging of enlisted men is a useful article, but the leather puttee of officers is hot in summer, an impediment in walking and leaping over obstacles, easily damaged by brushes and rocks which theoretically demand leg protection, and affording no protection against deep mud. The spiral puttee is really more serviceable. A rational solution of the problem is to modify the tailoring of the breeches so that they will join neatly with the shoe tops, dispense with the puttee altogether as a part of the regulation dress, and use canvas leggings or some form of rubber boot or high waterproof shoe as suggested above, simply for protection against water and mud.

As a matter of convenience rather than of hygiene, the breeches should be made so that they could be changed without removing the shoes, instead of rendering the soldier "obligately proteropantic."

There has been a good deal of agitation favoring the English turned-over coat collar and open front blouse. Personally the writer prefers the present style of uniform partly because it affords better protection in cool or cold weather, the regulation flannel or cotton shirt amply providing for hot weather, partly because it reduces the problem of the laundry to cuffs and collars, the latter, held by snaps within the blouse collar, reducing the time of dressing materially. When liable to sudden changes of station, the elimination of the (visible) shirt is an extremely practical

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matter. On the other hand, the overcoat should be modified so that it may be worn open at the throat in moderate weather, without presenting an unsoldierly appearance. That this is not a trivial point may be shown by the fact that it was no uncommon matter to have special police regulations or even specially designated police at camps, to compel men to button their overcoats. So general a violation of regulations indicates a real demand, whose hygienic basis is obvious.

ANNUAL MEETING OF THE ASSOCIATION WILL BE HELD IN NEW ORLEANS, APRIL 22d, 23 and 24. MEETING OF THE A. M. A. BEGINS APRIL 26. BEAR THIS IN MIND.

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OBSERVATIONS ON CASES OF SEASONAL HAY-FEVER DIAGNOSED AND TREATED WITH POLLEN EXTRACTS [1]

By Captain W. C. WILLIAMS
Sanitary Corps, United States Army

DURING the month of August, 1919, it was decided to make an effort to diagnose and treat fall hay-fever, with a view to determining the specificity and efficacy of the cutaneous tests for sensitiveness to plant pollens and the amount of relief that could be expected in the treatment of this condition with the extract of the particular pollen responsible for the symptoms.

It was well understood at this time that the opinion of workers in this field was practically unanimous that the greatest relief was to be expected from a prophylactic rather than from a curative standpoint and that the process of desensitization was more effective when started before the commencement of the hay-fever season than during an attack. It is to be regretted that we were unable to study the preliminary desensitization of any patients and that the only cases that we saw were those who had applied to the attending surgeon for relief after the development of well-marked hay-fever symptoms.

Bearing in mind the above facts, the results obtained at the Army Medical School are not to be taken as a final criterion of the value of pollen extracts in the prophylactic desensitization of persons subject to seasonal hay-fever and are presented only as a matter of general interest.

In all cases diagnosed, the simple cutaneous test was used, with pollen extracts obtained from a reliable commercial house. A slight abrasion is made on the flexor surface of the forearm for each pollen to be used and one for a control. These may be made with an ordinary needle or with a Von Pirquet borer, the abrasion being not over one-eighth inch in length and preferably not drawing blood. A drop of pollen extract is placed on each abrasion, while the control receives a drop of dilute alcohol in saline. A careful diagram should be made beforehand showing the distribution of the extracts to the abrasions. If rapid drying takes place the spot may be moistened with another drop of the extract. In positive cases a distinct reaction takes place usually within ten minutes and is seldom delayed later than twenty minutes. An urticarial wheal and more or less hyperemia rapidly develops at the site of the abrasion to which has been added the particular pollen to which the patient is sensitive. The control, naturally, shows no wheal and only a slight redness due to the irritation of the scarification. The

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treatments were carried out with graduated dilutions of the specific pollen extract, as determined by the cutaneous tests.

A total of 29 patients was seen from the time that we were in a position to diagnose, and make an effort to treat, fall hay-fever (August 15) until the last patient had cleared up with the advent of cool weather (October 10). Of these 29 people eight came in for diagnosis only and were not treated, while 21 were diagnosed and received a varying number of treatments.

The cases were diagnosed as sensitive to either ragweed or goldenrod pollen as follows:

Ragweed	22 or 81.4% of cases diagnosed.
Goldenrod	5 or 18.5% of cases diagnosed.
No reaction	2
Total	29

Of the cases failing to give any reaction one cleared up rapidly under treatment for bronchitis, while the other was not heard from again. Both cases were probably "colds" instead of true hay-fever.

Ragweed Cases.—The 22 cases of ragweed sensitiveness were divided as follows:

For diagnosis only	6
1 or 2 treatments only	4
Treated cases	12

The cases "for diagnosis only" need no remark, as they merely came in to find out which pollen they were sensitive to. Of the four cases receiving insufficient treatment but one is of interest, the other three being discharged or leaving the city. The one case in this group that is of interest, "Captain X," received a diagnostic skin test on August 25, followed by the smallest injection ordinarily given (0.1 c.c. of a 1 to 10,000 dilution). On August 27 the attending surgeon informed us that the patient claimed to have had an extremely severe reaction, with accentuation of eye and nose symptoms and great distress in breathing.

Of the remaining twelve treated cases, all received regular treatments of graduated dosage. Not a single one of the twelve patients showed any marked or, in fact, noticeable improvement or alleviation of symptoms until the advent of cooler weather and the end of the pollen season. One case, in spite of strenuous efforts to control it, progressed so rapidly and so severely that the patient was forced to leave the city for a prolonged sea voyage in order to obtain relief. Two of the cases stated that they felt a little easier after the injections, but this was not constant or permanent.

The results with the ragweed pollen extract as a therapeutic measure could not be considered encouraging. However, these patients were all requested to report next spring or early summer for a course of desen-

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sitizing treatments, to be completed before the commencement of the fall hay-fever season.

Goldenrod Cases.—An analysis of the five goldenrod patients shows that one case came in "for diagnosis only"; one had a very severe reaction following the first injection (0.1 c.c. of a 1-10,000 dilution), including increased asthma and some of the typical signs of hay-fever which she had never had before; while three cases received from three to six injections. The case with the severe reaction received, six days later, a diminished dose of 0.1 c.c. of a 1-20,000 dilution, but unfortunately did not return or inform us of the reaction following the second injection. It was later understood that she had left the city shortly after the second injection.

Of the three remaining cases, one received three injections with a remarkable improvement of both local and generalized symptoms, commencing after the first treatment and with all symptoms entirely subsiding after the third injection. The other two cases each received six treatments with a gradual but complete subsidence of all symptoms. It is of course possible that this may have been due to the change in the weather and the elimination of the pollen, as the final treatment was given one case on the 26th of September and the other case on the 30th of September.

The use of the extracts of goldenrod pollen gave manifestly better results than the ragweed pollen extracts. Although the series of cases was smaller and the treatments started slightly later in the season, introducing the uncertain element of the weather influence, it was felt that the patients received a distinct benefit from the treatments.

Summary.—(1) Of 27 cases of hay-fever diagnosed, 81.4 per cent were due to a sensitiveness to the pollen of the ragweed, while 18.5 per cent were due to a similar sensitiveness to goldenrod pollen.

2. The diagnostic cutaneous reaction offers a simple and clear-cut method of determining sensitiveness to pollen proteins.

3. Treatment with the extract of the ragweed pollen did not appear to have any favorable influence upon the course of the disease or the severity of the symptoms in twelve cases treated.

4. Treatment with the goldenrod pollen extracts in three cases was apparently beneficial in two cases and markedly so in one particular cases.

Any method of diagnosis or treatment that will offer a suggestion of relief to the vast army of sufferers from this really serious condition should be given a thorough and conscientious trial. It is hoped that we will be able to try the effects of early desensitization upon many of the same patients before the commencement of the autumnal hay-fever season this year.

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EDITORIAL

SIR WILLIAM OSLER (1849-1919)

The untimely death of Sir William Osler on December 29, 1919, at his home at Norham Gardens, Oxford, leaves a distinct void in the minds and hearts of hundreds of his professional colleagues, whom he had attached to himself by the charm, worth and distinction of his personality. As Regius Professor of Oxford, having the closest affiliations with Canada, the United States and the mother country, he was, in a sense, the great liaison officer of the Anglo-Saxon profession, and through the fact that as a senior consultant to the British force, he was a colonel in the R. A. M. C., rendering endless service on committees and in hospitals in the treatment of the sick and wounded, his kindness and hospitality to American officers in England during the war period, as recorded by Colonel Winter, will always be held in remembrance.

Osler was easily the leading physician of the English-speaking world, in other words, the teacher and inspirer as well as the writer, investigator, and actual practitioner of his profession. His book on "Practice," which displaced that of Sir Thomas Watson and has been translated into four foreign languages, is in every physician's library. A recent bibliography of his medical writings numbers 730 items, dealing with all aspects of internal and hospital medicine and medical history. As with so many eminent English physicians, Osler's most original scientific work, such as his discovery of the blood platelets, of the erythematous spots in endocarditis, of chronic cyanosis with polycythemia, was in the province of the circulation, which has been a kind of English specialty from Harvey's time down to the epoch-making work of Gaskell and the Cambridge Laboratory. Osler was a profound student of aneurism, endocarditis, tuberculosis, typhoid fever, but there are few aspects of inner medicine which he did not touch upon.

He was well-born, with the education of an English clergyman's son, capable of discussing the minutiae of Greek philosophy, with the learned Thebans of the high table, and, with such training, rose to the top of his profession by hard work, sans strenuosity. He came of a family whose sons, his brothers, all attained to high worldly place in Canada, and he had nothing whatever in his composition of the man who is hard and supercilious because his own rise in life was a matter of hard knocks. A kindlier, more whole-souled gentleman never lived. His humor was the essentially English humor of Ben Jonson's classis definition—now holding burlesque high court with some visiting prima donna of the

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profession, now hoaxing a medical society with a suppositious surgical case, now filing a brief for the soft-nosed chaps at a dinner made up mainly of the "fierce beaks of natures aquiline," now chaffing a whole, thin-skinned and easily guillible nation with what was nothing more than the old army prescription of retiring (sive "chloroforming") men in their sixties.

Osler's affiliation with the Medical Corps of the United States Army, to which Col. F. A. Winter has left such an eloquent tribute in the *envoy* of the Osler Anniversary Volumes, began with his early friendship with Billings and Fletcher. He once lost a library book in the street car. It was Billing's humor that he would never lend him another. This Osler became a frequent guest at the Surgeon General's Library where his warm and friendly personality soon made him known to the whole force, for anyone of whom he might, as he passed, have some pleasant or encouraging word. At the Army Medical Museum on February 28, 1894, he delivered his eloquent address on William Beaumont, which, with the well-known paper of Vaughan, did most to establish the definite position of Beaumont in the history of physiology. This paper contains perhaps the best advise ever rendered to young medical officers on the chances of doing scientific work at isolated military posts. The collection and cataloguing of the historical classics in the Surgeon General's Library and their preservation under glass were carried forward under direction of the then librarian (General McCaw) at Dr. Osler's suggestion. No other physician has done so much to inculcate the use and value of the Index Catalogue among his fellows and pupils at home and abroad. It was through his influence that volunteer hospital units from the United States went overseas to serve with the British in France in 1915. During the great war the pleasant retreat at Norham Gardens became a kind of Mecca for medical offices of the United State Army and Navy passing through England. No ordinary man could have inspired such nation-wide esteem and regard. In September, 1917, Sir William Osler's only son, a young lieutenant of artillery, and through his mother, a greatgrandson of Paul Revere, was mortally wounded in action in the Ypres salient and died shortly after. This grave loss was bravely borne by the great physician so long as his own activities with the sick and wounded kept his mind occupied. But the war over, it became obvious to his friends that a break in his health had occurred, and he actually met his death in line of duty, through pneumonia contracted by exposure in motoring back from Glasgow, whither he had gone to see a patient in consultation. THE MILITARY SURGEON begs to express its deep sympathy with Lady Osler in her loss, which is also a sad and grave loss to the whole medical profession.

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JOHN VAN R. HOFF

In the death of Col. John Van R. Hoff, Medical Corps, U. S. Army, Retired, that service has lost one of its oldest officers and one of the best known in the service.

Colonel Hoff was born in New York State on April 11, 1848, and after his graduation in medicine served at Omaha Barracks, Neb., as acting assistant surgeon, until November 12 of the same year, when he accepted appointment as Assistant Surgeon in the Medical Department of the Army and reported for duty on the 15th of November, 1874. During the years from 1874 until 1879 his service was on the Western Frontier, and he served during this period at Fort Sanders, Wyoming, Fort McPherson, Neb., and Fort Fetterman in Wyoming Territory.

In 1879 he was relieved from duty in the Department of the Platte and ordered to New York City, where, after examination, he was promoted to the grade of captain and served in the east at Fort Monroe, Va. In 1882 he was ordered to the Department of California and assigned as post surgeon at Alcatraz Islands, where he served until 1884, then relieving Surgeon George M. Sternburg at Fort Mason in the same state. In 1886 he was relieved from duty at Fort Mason and ordered to report to Fort Leavenworth, Kansas. During this year and 1887 he was on leave abroad and on his return was assigned to duty at Fort Reno, Indian Territory. After this he took station as post surgeon at Fort Riley, Kansas, during which period he spent considerable time with troops in the field. In 1890 he was ordered from this duty. On November 23 he took the field with eight troops of the 7th Cavalry and Light Battery E of the 1st Artillery, in camp at the Pine Ridge Agency, South Dakota, and was on duty with them from that time up to and through the fight with the Big Foot band on Wounded Knee Creek on December 29 and 30 and at White Clay Creek on December 30 of the same year.

During this Indian outbreak he conducted himself with marked gallantry in the performance of his duties as surgeon, and this is entirely evident from the fact that a General Order was published from the Headquarters of the Army recommending officers who had shown gallantry at various times during that year. This is General Order No. 100, H. Q. A., A. G. O., December 17, 1891, and begins—

> The Major General Commanding takes pleasure in publishing in orders to the Army the names of the following officers and enlisted men who, during the year 1890 and in the recent campaign in South Dakota, distinguished themselves by "specially meritorious conduct in service."

In the body of this General Order is the following citation in respect to Colonel Hoff:

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December 29 and 30, 1890. Major John Van R. Hoff, Surgeon (then Assistant Surgeon), U. S. Army: for conspicuous bravery and coolness under fire in caring for the wounded in action against hostile Sioux Indians, at Wounded Knee Creek, South Dakota, on the 29th, and near the Catholic Mission, at White Clay Creek, on the 30th.

As an evidence of the fact that service on the frontier at that time was not a sinecure, it may be mentioned that immediately on his return to Fort Riley from this duty he was ordered to proceed to the camp near Florence, Kansas, to care for those of the 2d Battalion of the 7th Cavalry and Light Battery E, 1st Artillery, and of Light Battery F of the 4th Artillery, who had been injured in a railroad accident at that point.

On June 15, 1890, he was promoted to the grade of major. In July, 1892, while on duty at Fort Riley, by special request of Governor R. E. Pattison of Pennsylvania, he accompanied him on a tour of inspection of the camps of the National Guard of Pennsylvania.

In the same year he was relieved from duty at Fort Riley and ordered to report to Fort Columbus, New York, for duty. In September, 1893, while on duty in New York Harbor, he was appointed a representative of the Medical Department of the Army to accompany the foreign delegates of the Pan-American Medical Congress to Boston, Saratoga, Niagara, Detroit, Cincinnati, and Chicago.

In 1896 Colonel Hoff was appointed a member of a board of officers to meet at David's Island, New York, for the purpose of revising drill regulations for the Hospital Corps of the Army.

In 1896, after his completion of his tour of duty in the East, he served at Vancouver Barracks, Washington.

In 1898 Colonel Hoff left Vancouver Barracks in compliance with orders and reported to the Surgeon General at Washington, where he was commissioned as lieutenant colonel of volunteers as of date of May 12. He was announced as chief surgeon of the Third Army Corps and served at Chickamauga Park, where he was on various duties, including that of chief surgeon of the Third Army Corps. On September 21 he was relieved from duty and on October 19 sailed for San Juan, P. R., as chief surgeon.

July 24, 1900, he was relieved from duty as chief surgeon of the Department of Porto Rico and ordered to report in person to the Surgeon General of the Army at Washington and sent by him to Peking, China, to report to Maj. Gen. Adna R. Chaffee, who was in command of the United States forces in China, for duty as chief surgeon on his staff. After completion of this duty he served as chief surgeon of the Department of the Lakes with headquarters in Chicago. After a

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short tour there he was relieved from duty and ordered to report to the Surgeon General in Washington for duty in his office.

In 1902 he was promoted to the grade of lieutenant colonel and was appointed member of the board of officers to meet in March of that year for the purpose of considering the subject of modification of uniform equipment of officers and men in general.

November, 1902, he was ordered to duty at Fort Leavenworth, Kansas. His services at Fort Leavenworth continued until May, 1905, when he was designated by the Secretary of War as an observer with the Russians in the Russo-Japanese War and directed to report to St. Petersburg in line of this duty. On November 11 he returned to the United States. On completion of his duty in Washington writing his report of experiences as observer of the Russian Army, he was relieved from duty at Fort Leavenworth and sent to Omaha as chief surgeon of the Department of the Missouri.

December 3, 1906, he reported at Manila, P. I., as chief surgeon of the Luzon. He served in the Philippines until December, 1908, when he was relieved from that duty and returned to the United States.

In 1909 he reported as chief surgeon of the Department of the Lakes with headquarters in Chicago. December, 1909, he was transferred to the Department of the East as chief surgeon, with headquarters at Governors Island, where he served until the time of his retirement, April 11, 1912.

This record of Colonel Hoff's service will make it plain to all who read it that the many years he gave to his country were active years, filled with important duties and with a record of things well done.

His passing willl be a cause of sorrow to very many, not only in the Army of which he formed so distinguished a member, but many in other services and to the countless friends whom he made in his life amongst those whose duties lay in civilian life. He was a man of much natural charm, of pleasant address, and, withal, of a dignity which well became his erect bearing and soldierly appearance.

He gave his best to the service of his choice, and it was due to the direction of the efforts of his able mind that many changes, and always changes for the better, were made in respect to the organization of the Medical Corps which he saw grow up and develop from its more simple predecessor, the Medical Department. There are many in the Army Medical Corps now who remember him with affection on account of his personal traits and who also remember him with gratitude, because, through his wise counsel and sober advice, they profited much in the learning of the profession of military medicine.

Colonel Hoff's service, as a younger man, on the western frontier

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carried with it commendation for his personal bravery and devotion to duty at Pine Ridge, as has been evidenced by the quotation of the order of the general in command.

His work at Porto Rico, notably in the eradication of smallpox in that island, met with universal commendation as did his orderly arrangement of medical affairs in that department. He was known in Washington for his ability as an organizer and an administrator, and played no unimportant part on the board which was charged with the changes in the uniform.

These are only the salient points in his career, and it is difficult, in a life so full of accomplishments, to choose for particular commendation any one thing.

Those who knew him, those who had the privilege of his acquaintance, of his friendship, those who knew the honorable record which stretched behind him as far as the limit of his life, feel that all that he did might be summed up in the words of the Master, "Well done, thou good and faithful servant."

JAMES ROBB CHURCH.

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ASSOCIATION NOTES

At a meeting of the Executive Council of The Association of Military Surgeons, January 6, 1920, the following names were proposed and elected to membership in The Association:

Medical Corps, U. S. Army

Colonels

Charles Y. Brownlee
Harold W. Jones
John S. Lambie
Louis B. Wilson

Lieutenant Colonels

Harry R. Beery
John W. Meehan

Majors

Herbert A. Durham
Francis E. Fronczak
Walter B. Harvey
Frederick K. Herpel
Mark D. Hoyt
Frits C. Hyde
John P. Jones
Frederick Knowles
George D. Marshall
Pleasant P. Nesbitt
Charles B. Palmer
Edward W. Peterson
Prince E. Sawyer
Edward A. Sharp
Francis E. Shine
Joseph S. Wheelwright

Captains

Edward McP. Armstrong
John W. Balke
William M. Blair
Frank E. Boston
Carl S. Bungart
William A. Burns
Joseph H. Chiles
Kemper L. Colley
Amplias W. Davis
Homer D. Dudley
Anfin Egdahl
William P. Evans
Lloyd H. Fochtman
Omer O. Gain

Captains—Continued.

Philip P. Green
Joseph M. Hancock
Henry O. Hagen
Paul T. Hurt
Robert M. Jones
Ray Kessel
Harry W. Kinne
Philip Lewin
Leonard J. Loewe
Alexander M. Macaulay
John E. Manney
Otis Martin
Wesley S. Neal
Carroll D. Parsons
Erling O. Ravn
Claude N. Rucker
Henry T. Schiffley
Omar H. Shively
Walter D. Simmons
Joseph S. Smeall
James J. Snipes
George E. Sutton
Herbert G. Vaughan
Samuel E. Weiner

First Lieutenants

Charles H. Allen
Harry A. D. Baer
Joseph H. Baker
Lewis K. Eastman
Wellington D. Griesemer
Raymond C. Jones
John C. Kibler
Eugene L. Laurence
Harry H. Lawrence
Frank H. Mervis
Joseph T. Meyer
W. Leland Mitchell
Homer F. Moore
Lester D. Riggs
Michael Sarla
Emile C. Schulze

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First Lieutenants—Continued.

Theron H. Slaughter
Dallas Southard
Harve B. Spangler
Steven F. Weygandt

Medical Reserve Corps, U. S. A.

Colonels

Astley P. C. Ashhurst
William LeRoy Dunn

Lieutenant Colonels

W. H. Bergtold
Dudley S. Conley

Majors

Robert W. Brace
Byron B. Colvin
Alfred W. Duff
Jay D. Dunshoe
Frederick F. Miller
Charles P. Gray
James Hamilton, Jr.
Orrie I. Hetsler
Allen L. Lear
Addison L. Lincecum
Frank H. McGregor
Houston H. Parsons
Ira Lee Parsons
Clement D. Smedley
Clarence G. Toland
Tullie Van Boyd
Lee W. Wiggins

Medical Reserve Corps, U. S. A.

Captains

Herbert M. Bergamini
James H. Huddleson, Jr.

Captains—Continued.

John A. Johnson
Elisha H. Jones
Henry W. A. Lee
Gebhard J. Long, Jr.
Frederick Wm. Schaeffer
P. F. Southwick
John Swancott
Timothy C. Weber

First Lieutenants

Walter M. Caton
Anthony J. Font

Medical Corps, U. S. Navy

Lieutenant

Saverio A. De Yoanna

Medical Corps, U. S. N. R. F.

Lieutenants

Wm. A. Doebele
Ferdinand M. Smith

Medical Corps, Natl. Guard, U. S.

Capt. Charles S. Kubik
First Lieut. Lloyd B. Whitman

Associate Members

Pharmacist Wm. C. Dale, M. C., U. S. N.
Major Gerald D. Byrne, D. C., U. S. A.
Major Arnett P. Matthews, D. C., U. S. A.
Lieut. Col. Wm. H. Goodwin, M.C., U.S.A.
Major Murray S. Danforth, M. C., U. S. A.
Capt. Charles H. Marcy, M. C., U. S. A.
Capt. Richard A. Roach, M. C., U. S. A.
1st Lt. Chas. W. Finnerty, M. C., U. S. A.
1st Lt. Clarence B. Livingston, M.C., U.S.A.
Maj. C. G. Berardinelli, M. R. C., U. S. A.
Maj. Geo. F. Glass, M. R. C., U. S. A.

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COMMENT AND CRITICISM

SOME PROBLEMS FACING THE T. B. EXPERT IN FRANCE

In dealing with pulmonary conditions it is necessary for those of us with experience in France to view them from a slightly different angle to what we were formerly accustomed to do in civil practice.

The cardiovascular expert now determines whether or not a man can carry on, not alone by the ascultatory method but also by trying him out and seeing just exactly what his heart is capable of doing upon exertion. Because he has a murmur is no reason why he should be discharged as unfit, for we have all seen just such individuals carry on through a strenuous life without apparent discomfort. In like manner certain types of chest pathology should not be the sole cause for disqualification.

A subterfuge is very often sought as cause for exemption, as those who have had to deal with draft troops well know. Just so, after reaching France, some cause for disqualification and return home becomes the fixed idea of a certain class of men.

To make things more difficult, the medical man often takes the easiest road for sending back a soldier who seemingly is unfit for duty, either physically or temperamentally; and upon whom a definite diagnosis cannot be made. And so he is tagged as "observation T. B." and returned.

Thus it is that the T. B. centers become filled to overflowing with all sorts of cases, some of whom have chest pathology, but the larger proportion without any tubercular infection.

The conditions, as we see them, can be divided into three classes: First, the moderately or far advanced cases; second, the incipient and by far the smallest class; third, catarrhal conditions which are non-tubercular. It is the third class that we find for many reasons the most difficult to dispose of.

It may take a period of months for a chest to completely clear up (in this damp climate), following a bronchitis or pneumonia, and during this time there is no reason why, under the circumstances, the man cannot be in an organization and on active duty, especially in the S. O. S. or even in the lines, if he is otherwise fit. The soldier has become more or less hospitalized, due to his stay or rather passage from hospital to hospital, and, what is more to the point, has learned the various symptoms of the disease of which he is a supposed victim. From a cough which he may originally have had, or may still have, he gradually passes through the cycle to where an hemoptysis and considerable loss of weight is a

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mere "bag of tell." Furthermore, having perhaps had a taste of fighting, the farther he gets from his organization the more anxious he is to take the first boat for home.

At this point I may say that the history, which ordinarily in practice at home bears a very large part in the early diagnosis of T. B., in the Army has to be absolutely disregarded. The reasons are obvious, depending upon whether the man wants to return to his outfit or be invalided home, how he states his case and answers the questions put to him. The sputum examination, which ordinarily is considered proof positive, in a few cases counts for nothing. We have had men exchange sputum cups or sputum, and only after careful watching were we able to confirm our suspicions. One method employed by us was to transfer the patient to another ward or a different hospital in the center and, while there, have repeated specimens examined. Another was to put a few drops of phenol hydrazin in all the cups of the positive cases, after sterilization, and test the sputum of the suspected case for this. This proved invaluable to us, and several cases were detected in this manner.

A man with a few indefinite signs in his chest, which as far as can be discerned are non-tubercular, is perhaps classified and sent to a retraining camp. He suddenly gives a history of blood spitting or of excessive fatigue or of cough, and appears at sick call. The result is obvious, and in view of his history and examination he is once more a patient in the nearest hospital and perhaps gradually once more travels back toward the base. Each time when rumor reaches him that he may be returned to duty, his symptoms are aggravated, and so the surgeon, not wishing to make a mistake, passes him along.

So the problem is narrowed down to training the individual in as short a time as possible and endeavoring to clear up the chest condition, whatever it may be, and render him physically fit before sending him on his way.

We have endeavored to study the problem from all angles: First, the retraining or convalescent camp, but found a certain number of repeaters; then the reclassification camp, with a like result; and so we turned to and began retraining the men while still under our immediate supervision, beginning as soon as possible after admission to the hospital (when there was no discernible lesion in the chest). In this way very little time is lost, and there is not that more or less prolonged period of inactivity which usually accompanies the observation of T. B. cases. Those men who will eventually return to duty—and we have a goodly proportion—are not allowed to soften up and get out of trim, but are kept in shape by various methods of exercises. Of course we find that we have, in our classes, men who have some activity and who have to be returned to the

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States. However, I do not feel that we have done them any injury, as perhaps a small amount of exercise was all that was required to stir up their process, causing a slight rise in temperature and accentuation of their signs, thus giving us the picture that the medical man who first saw the patient had. So in a doubtful case, time, which is valuable both to the patient, whose speedy return home is essential, and to the Government, which is constantly calling for empty beds, is saved.

As we well know, fever occupies one of the most important places from a diagnostic point of view. It gives one of the earliest evidences of activity, and in no other disease do such relatively small differences in temperature possess such importance. So in afebrile cases it is possible to disclose an otherwise hidden temperature by exericise.

We did not stop at a three-day record, but kept up the temperature records as long as the patient remained with us. A chart procured in this way—and a slight rise in temperature might be overlooked if the patient were kept quiet—lends valuable aid to diagnosis in an obscure case, especially when time is such an important factor to be considered.

First a truck garden was started, which method brought fairly good results, and the general morale of the camp certainly was much improved. It kept the men out of doors, besides getting their minds off their condition. A certain proportion gained in weight, and we noticed a marked increase in the "chow line." After keeping this up for several months we decided to change our plan to a more systematic method if one could be devised. Besides, gardening is impossible in the winter time.

So we began over again. After examination we classified the men, putting them first in Class "C," so called for convenience, for a short setting-up exercise, gradually advancing them to Classes A and B as they stood the tests. Hikes were begun and gradually lengthened, and although some dropped out, the great majority were glad of the chance to get out and walk and get away from camp. We examined the ones who dropped out and attempted to ascertain the reason. Very often we discovered some other complaint and transferred the patient to the proper ward. In some, the signs did not change very much, even though they stood the longest hikes and could play any game without perceptible fatigue. These, if there were still no definite signs of active tuberculosis, we returned to duty, and in others, the largest percentage, the moisture cleared up and they were once more good specimens of soldiers.

In the old, not completely resolved pneumonias, of which we had quite a number, the best results were obtained. Here the moisture seemed to dry up fairly rapidly, and what at first appeared as a pathological condition turned out, as is usually the case, to be only delayed resolu-

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tion. This class of case we found improved with drainage, and the knee chest and inverted positions were used at regular intervals.

Those cases of plastic pleuritis so commonly met with, and which gave us no end of trouble on account of their repeated return to the camp with the diagnosis of T. B. of the bases, remained for the most part unchanged, and will probably stay with the patient for an indefinite period, although of no marked significance.

A number of cases of effort syndrome found their way to us, being diagnosed as pulmonary conditions because of their tachycardia.

Perhaps the thing that impressed me most was the change in attitude of the average individual. He seemed to get into the spirit of the hospital, liked the atmosphere that prevailed, and as a result was anxious to get better and return to duty. Where formerly it was a rarity for a man to ask to return to his organization, later it was an every-day occurrence to be spoken to about returning to one's regiment.

Thus, while getting the patients into shape, they are kept under close observation. Sputum examinations were made until at least ten negative reports were returned; temperature records, a. m. and p. m., kept, as are also the pulse records. The weights were tabulated and the X-ray of course, studied, and as close a study as possible made of each case, to arrive at a final diagnosis as soon as possible.

I do not think that any harm was done, but a great deal of good, by starting early at the exercises. Of course much further study is required before definite conclusions can be arrived at, but up to date the results have indeed been most satisfactory, from an army standpoint.

IN REFERENCE TO SPLINTS USED BY THE A. E. F.

In the November issue of the magazine there was published an article headed "The Transport Splints of the American Expeditionary Forces," by Lieut. Col. Robert B. Osgood, M. C., U. S. Army. After publication of the article, we received the following letter from the Clinton-Wright Wire Co.:

CLINTON-WRIGHT WIRE COMPANY

WORCESTER, MASS.,

COLONEL JAMES ROBB CHURCH,
Army Medical Museum
Washington, D. C.

MY DEAR COLONEL CHURCH:

We read with interest your letter relative to Colonel Osgood's article on splints which appeared in THE MILITARY SURGEON. We do not doubt the complete reliability of the statements made by Colonel Osgood, but we feel that the story of splints used by the American Expeditionary Forces would not be complete without mention of the

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fact that Wright Wire Company, now a part of Clinton-Wright Wire Company, manufactured more than 1,000,000 wire gauze splints, and was filling an order that would bring the total up to 1,600,000 at the time of the armistice.

Many of these splints were sent overseas and were largely used in first aid.

Very truly yours,

(Signed) JOHN W. ODLIN,
Advertising Department.

Upon referring this to Colonel Osgood he wrote us in reply as follows:

COLONEL JAMES ROBB CHURCH,
Army Medical Museum,
Washington, D. C.

DEAR COLONEL CHURCH:

I am sorry that there should have been any misapprehension concerning the meaning of my statement in the article on the transport splints. This referred of course to the transport splints originally manufactured for the use of the expeditionary forces and referred only to the transport splints used abroad. As far as I know there were no other splints used with our armies in the A. E. F. for transport, except these splints manufactured through the agency of the Red Cross, but it is quite possible that I have been misinformed concerning the matter. I am aware of the fact that a large number of splints were manufactured in this country, but the patterns of these splints were somewhat different from those adopted overseas, and as far as I am aware they were not used in transporting the wounded.

I should be entirely agreeable to an insertion in THE MILITARY SURGEON saying that the article may have given the wrong impression; that as far as I am aware all the transport splints for the American Expeditionary Forces were manufactured in special shops under the agencies of the American Red Cross. Of course I am aware also that many splints were made under the supervision of the Medical Department of the United States Army entirely independent of the Red Cross, but it was my impression that these were only used in the base hospitals in this country or as a part of the equipment of the base hospitals sent abroad. I think I am rightly informed that these splints were not used in transporting the wounded back from the front, and that these made on this side were of a slightly different pattern.

Sincerely yours,

(Signed) ROBERT B. OSGOOD.

EXAMINATIONS FOR APPOINTMENT IN THE MEDICAL CORPS OF THE REGULAR ARMY

The Surgeon General of the Army announces that preliminary examinations of all eligible applicants for appointment in the Medical Corps, U. S. Army (regular) will be held on March 15, 1920, at various points throughout the United States, in the Philippine Islands, Hawaiian Islands, Panama Canal Zone and Porto Rico, and in France, Germany and Siberia, of applicants in the military service.

The essential requirements for eligibility to take the examination are that the applicant shall be a citizen of the United States, of good moral character and habits, between twenty-two and thirty-two years of age,

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a graduate of a medical school legally authorized to confer the degree of Doctor of Medicine, and shall have had at least one year's post-graduate hospital interneship.

The requirement that an applicant for appointment in the Regular Medical Corps shall have served at least a year's post-graduate hospital interneship, is waived in the cases of those applicants who have satisfactorily served as commissioned officers for a period of at least one year during the World War.

The Government cannot pay any portion of an applicant's expenses incurred in connection with the examination, and in designating the places of examination, due consideration will, therefore, be given to localities from which applications are received in order to lessen such expenses as far as possible.

The examination will be both physical and professional. The physical examination will be thorough. Candidates who fall below 64 inches in height will be rejected. Each candidate must certify that he labors under no physical deformity or disability which can interfere with the efficient discharge of any duty which may be required. Errors of refraction, if vision is not below 20/100 in either eye, are not causes for rejection, provided they are not accompanied by ocular disease and are entirely corrected by appropriate glasses.

Physical Proportions for Height, Weight, and Chest Measurement

Height	Weight	Chest measurement	
		At expiration	Mobility
Inches	*Pounds*	*Inches*	*Inches*
64	128	32	2
65	130	32	2
66	132	32½	2
67	134	33	2
68	141	33¼	2½
69	148	33½	2½
70	155	34	2½
71	162	34¼	2½
72	169	34¾	3
73	176	35¼	3

It is not necessary that the applicant should conform exactly to the figures indicated in the foregoing table. The following variations below standard given in the table are permissible when the applicant is active, has firm muscles, and is evidently vigorous and healthy.

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Height	Chest at expiration (inches)	Weight (pounds)
64 and under 68....	2	8
68 and under 69....	2	12
69 and under 70....	2	15
70 and upward.....	2	20

The professional examination will be a written one and will embrace the following subjects: Anatomy, physiology and histology, materia medica and therapeutics, surgery, practice of medicine, obstetrics and gynecology. The minimum passing mark is 80 per cent.

The Medical Corps consists of commissioned officers in number approximately equal to seven for every one thousand of the total number enlisted strength of the Regular Army as authorized from time to time by law, proportionally distributed among the grades and in the ratios as follows: Colonels, 3.16 per cent; lieutenant colonels, 5.42 per cent; majors, 23.7 per cent; captains and first lieutenants, 67.72 per cent; and two brigadiers general in addition to the Surgeon General, who holds commission in the grade of major general.

Original appointments are, as required by law, made in the grade of first lieutenant and while at the present time it is necessary that a first lieutenant serve in that grade for five years before promotion to the grade of captain, legislation has been recommended that the period be reduced to three years. Promotions to the higher grades are made as vacancies occur and all promotions are subject to examination.

To each rank is attached a fixed annual salary which is received in monthly payments and this is increased 10 per cent for each period of five years' service until the maximum of 40 per cent is reached. At the present time a first lieutenant receives $2,000 per annum or $166.66 monthly; at the end of five years he receives the pay of a captain, $2,400, with an increase of 10 per cent after five years' service, making $2,640, or $220 per month. After ten years' service the pay would be $2,880 annually, or $240 per month. The pay attached to the rank of major is $3,000 a year, which, with 10 per cent added for each five years' service becomes $3,600 after ten years' service, $3,900 after 15 years' service, and $4,000 after twenty years. The maximum monthly pay of lieutenant colonel, colonel, and brigadier general is $375, $416.66 and $500, respectively. Officers, in addition to their pay proper, are furnished with allowance of quarters according to rank, either in kind, or where no suitable government building is available, by commutation; fuel and light therefor are

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also provided. When traveling on duty an officer receives mileage for the distance traveled, including the travel performed in joining first station after appointment as first lieutenant. On change of station he is entitled to transportation for professional books and papers and a reasonable amount of baggage at government expense. Groceries and other articles may be purchased from the commissary at about wholesale cost price. Instruments and appliances are furnished for the use of medical officers in the performance of their duties. Well-selected professional libraries are supplied to each hospital, and standard modern publications on medical and surgical subjects, including medical journals are added from time to time. At each military post there is also a laboratory, and medical officers are encouraged to carry on any special line of professional study which appeals to them and which fits them for their duties as medical officers.

The Medical Department is operating a number of large general hospitals which offer exceptional advantages to medical officers, whose detail to duty in these institutions is made as the exigencies of the service permit so as to afford opportunity for purely professional work along the line of general medical and surgical service as well as the specialties.

Officers of the Medical Corps are entitled to the privilege of retirement after forty years' service, or at any time for disability incurred in the line of duty. On attaining the age of sixty-four, they are placed on the retired list by operation of law. Retired officers receive three-fourths of the pay of their grade (salary and increase) at the time of retirement.

While the present maximum age limit for appointment in the permanent Medical Corps is fixed at thirty-two years, it is believed probable that by prospective legislation that limit may be modified somewhat in the cases of those applicants who have had military service during the World War, and who are beyond the present age limit. Any such person may, therefore, submit application regardless of his present age, in order that he may be given opportunity for examination, should the suggested change be made prior to March 15, 1920.

Applications should be in letter form, addressed directly to the Surgeon General, United States Army, Washington, D. C., and should have embodied therein the following data in the order indicated:

a. Name in full. (Initials not acceptable.)
b. Date of birth.
c. Place of birth.
d. Permanent home address.
e. Medical school or schools from which graduated with dates.
f. Professional experience.

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g. If an officer who has served during the emergency, complete statement of military service, setting forth (1) the organizations in which served and inclusive dates, (2) present organization if still in the service, (3) grade in which originally appointed, (4) present grade if still in the service, (5) date, place of discharge and rank at time of discharge if no longer in the service.

h. Statement of any service as a contract surgeon, in the Medical Reserve Corps, in the Medical Section, Officers' Reserve Corps, or in the Medical Service in Volunteers.

i. In cases of alien birth, (1) documentary evidence of naturalization, (2) if naturalized through parent, documentary evidence of father's naturalization and sworn statements from two reputable United States citizens establishing relationship between candidate and his father.

Approved applicants will receive an invitation from the Surgeon General, United States Army, to report to the examining board convened at the point nearest to their homes.

At the present time there are, approximately, seven hundred and thirty vacancies in the Medical Corps.

M. W. IRELAND,
Surgeon General, U. S. Army.

THE MILITARY PROGNOSIS OF SOME NEURO-PSYCHIATRIC AFFECTIONS[1]

BY DR. TOM A. WILLIAMS

Corresponding Member Society of Neurology and Society of Psychology of Paris; Corresponding Member, National Academy of Medicine of Rio de Janeiro: Lecturer on Nervous and Mental Disease, Howard University, Washington, D. C.; Neurologist to Freedman's Hospital.

In every appreciation as to an individual's military capacity there is the possibility of a prognostic error; for a man who appears to be recuperated may not really be capable of withstanding conditions at the front. The number of cured cases, however, which have done so was very great in the French Army.

Where unfitness for military duty is a question greater certitude can be reached. Experience has shown that *men who have been trephined* can rarely stand fire. This is so even in men with a normal cerebrospinal fluid and without headaches. It is very seldom that a man whose dura mater has been penetrated has been free of hyperemotivity, excessive fatiguability and cardiac instability. The reactions of these men are also slowed, as measurements demonstrate.

When *commotion without wound* has occurred, men may be fit for the front provided that they are free of headache, faintness, dizziness and

[1] Adapted from a personal communication of Prof. Laignel-Lavastine.

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when their emotional, labyrinthine and spinal fluid reactions are not abnormal.[2]

Meningeal inflammation need not permanently unfit a soldier for duty. Even persistence of lymphocytosis and increase of albumen in the spinal fluid need not prevent a man returning to duty provided he has no neurological symptom and his general condition is good. This is particularly true where syphilis is concerned.

In *intoxication of the cerebrum* showing itself as mental confusion, a good prognosis can usually be affirmed.[3] A man can return to duty as soon as he is sleeping well and shows no slowing of reactions, more especially in his social relationships. Besides this the reliability of the memory must be assured in the case of an officer.

An *attack of melancholia* need not prevent a man from returning to the front as soon as his weight recovers and social activity is resumed. The same is true of maniacal hyperemotivity.

Very differently must be envisaged the *emotionalism* which is studied in Vol. I, Section III of forthcoming book "Disorders of the Nervous System in Warfare," where all of these disorders are intensively discussed, the *consequence of fatigue*, endocrine irregularities and prolonged strain. The recovery of these cases is not only prolonged but uncertain; as there are often profound bodily changes, more especially in the endocrine system, showing themselves as vasomotive dystaxia, tachycardia, disturbance of the occulocardiac reflex, abnormal reactions to hot or cold applications and to the injection of endocrine and other re-agents and obstinate disturbances of the secretions. Some men, in spite of these physical reactions, can dominate their emotions so as to appear brave at the front again, but even these men must break down before long because of the great strain entailed. Thus it is undesirable to return to the front a hyperemotive with marked changes in physical reactions.

On the contrary, when *emotionalism is purely psychogenetic* it can be removed psychotherapeutically, even when it is of long standing.[4]

The pseudo-emotionalism shown by some hysterics must be distinguished from the foregoing. Its mechanism is fully discussed in the chapter on "Hysterical Crises."

Hysterics must be rigidly differentiated from *asthenics* in whom the evidences of fatigue are revealed by low blood pressure, chilly extrem-

[2] Boston *Medical Journal*, January 8, 1920.

[3] See "Management of Confusional States," International Clinics, 1916: also "Diet in Psychiatry" in Fitch's "System of Diet," 1917, and in Transactions American Medico Psychologic Association, 1017.

[4] See again Vol. I, Section III; also, "Removal of Besetting Fears," International Clinics, 1919.

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ities, poorly reacting heart, glandular insufficiencies, against which the best psychotherapy is of course thrown away.

Psychoprophylaxis against harmful suggestions must not be omitted, however; but even here opotheraphy, generous feeding and rest outrank syllogisms. Most fatigued men recover completely, although a minority are less able than before to withstand hardship.

Motor or sensory hysteria without marked emotionalism is still more readily curable; and every case should be available for the front if precautions against fresh suggestion and relapses are properly taken en route, and especially at the regimental depot. This is especially required when there is a tendency towards exaggeration or malingering in the case.[5]

Sinistrosis must not be confounded with hysteria. It consists of the state of mind which, believing itself aggrieved, imperiously demands redress from society, this being in military life the army authorities or the nation. It occurs more especially in men who have been wounded, but it may occur in the case of ill health without wound, and even when the ill health is purely imaginary or the wound trifling. In civil life demand for indemnity is the most usual manifestation. In war time this is complicated by the desire to avoid returning to the front.

Theoretically, *sinistrosis should be curable* like every psychogenetic state.[6] Practically it is regarded as incurable, so obstinately do these men hold their claims. That this pessimistic prognosis is unjustifiable is possible if we envisage adequately the data of modern psychotherapy, and if we are prepared to utilize our ingenuity in modifying the motivation of these patients in a constructive fashion. There are indications of the success of methods in which this principle has been utilized in a broad way. I refer to the training camps for convalescents so largely used in the last two years of the war by the British forces in France. (See chapter, "Management of Convalescents.")

The advice to dismiss from the army cases of sinistrosis is very general. This counsel does not consider the pernicious influence of these men upon civilian morale.[7] It is therefore less dangerous to keep them in the Army in special centers, isolated from contact with their fellows, as was being done in France towards the end of the war.

To be distinguished from the sinisters are the cases of simple *exaggeration and perseveration* which are almost the rule in wounded or sick soldiers. Some of them are very obstinate, but the majority can be successfully dealt with by a medical officer who does not allow his heart

[5] See "Military Hysteria" in MILITARY SURGEON, Nov., 1919; see also "Induction of Hysterical Symptoms and Their Removal," *Medical Record*, January 8, 1920.

[6] See "The Traumatic Neurosis," Jour. Crim. Law, 1916, *Am. Journ. Med. Science*, 1915, etc.

[7] See forthcoming article, "Military Hysteria in Relation to Industrial Morale."

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to run away with his head, and who, of course, understands the psychology of the soldier.

An obstinate *perseverator should never be discharged*, as has been the practice in some armies. It affords an example far from salutary to other soldiers and is of incalcuable harm to the civilians who learn of his successful evasion of service. When perseveration takes the form of persistent pain, the patient is often sincere. This is particularly true of pains in the back, or of sciatica, or of pains in a wound or joint. A proper reëducation, followed by training, renders the man fully fit for active service. (See chapter on "Algias and Faulty Attitudes.) Faulty attitudes and movements often follow periods of prolonged pain. Reëducation will likewise remove them and restore their producer to duty.

Defectives who become hospitalized from some other cause need not necessarily be discharged because defective. When cured of their acute condition they become useful in labor battalions or may even be fit for strictly military service.

Constitutional psychopaths should either be discharged or utilized for active duty. They are disturbing elements among troops at rest.

INFORMATION FROM POLAND

THE MINISTRY OF PUBLIC HEALTH, REPUBLIC OF POLAND HEADQUARTERS
POLISH TYPHUS RELIEF EXPEDITION
UNITED STATES ARMY
WARSAW, POLAND.

Bulletin No. 1. *October* 23, 1919.

ORGANIZATION

For purposes of administration the Republic of Poland has been divided into six districts, numbered consecutively from one to six. The headquarters of the first is at Warsaw, of the second at Lodz, of the third at Kielce, of the fourth at Lublin, of the fifth at Lomzia, of the sixth at Lwow.

The active operations for the elimination of typhus and other infectious diseases are being handled by the Central Committee of the Ministry of Public Health. The Central Committee consists of three officers: Colonel H. L. Gilchrist, Medical Corps, U. S. A., commanding the American Polish Typhus Relief Expedition; Dr. Wiktor Hryszkiewicz, and Dr. Ludwik Rajchman, of the Ministry of Public Health of Poland.

Departments of Propaganda, Transportation, Statistics, Hospitalization, Quarantine, Finance and Schooling, under the Central Committee, have been established. The Transportation Officer is responsible for rail, motor and other forms of transportation. All property and supplies are handled by the Finance Department. A Polish officer has been placed in charge of each department.

Each district is divided into counties, eighteen to twenty-five in a district. At the head of each county is a County Medical Officer of Health, appointed by the Minister of Public Health.

Medical officers of the United States Army on duty with the expedition are assigned to districts as follows: Lieutenant Colonel Lee R. Dunbar, to Lublin;

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Lieutenant Colonel E. C. Register, to Lwow; Major Willis P. Baker, to Kielce. These officers are closely associated with the Polish District Medical Officers and not only act as advisers but also conduct activities in cooperation with the district officer.

PERSONNEL AND EQUIPMENT

Twenty-two officers and 420 men are now on duty with this expedition in Poland, this personnel having convoyed to Warsaw the thirty-one trainloads of supplies thus far received for use in the anti-typhus work of the Polish Ministry of Health. In this huge shipment of equipment one notes with particular interest the 10,000 beds, 40,000 bed equipment, 1,000 tons of soap, 50 tons of washing soda, 1,000,000 suits of underwear, all the mobile laundries and sterilisers of the American Expeditionary Forces, 320 ambulances, 320 touring cars, 160 heavy trucks, and a large quantity of drugs and other supplies, all of which were purchased from the American Army in France.

Included also in this movement across Germany, accomplished under many difficulties, were five complete hospitals trains for the Sanitary Section of the Polish army, 68 cars of American Red Cross supplies, property and personnel for the Y. M. C. A. and the American Y. W. C. A., spare parts and miscellaneous supplies in less carload lots for practically every American mission and relief organization in Warsaw. The end of the tremendous transportation task is in sight, and with it comes a feeling of work well done.

OPERATIONS

Motor repair shops have been established at Zegrze, just out of Warsaw, at Lublin, Kielce and Lods. These repair parks are fitted to care for motor vehicles of all kinds. They are under the command of officers of the United States Army.

A school for the instruction of Poles in the use of motor vehicles, steam sterilisers, and other equipment purchases from the American Army is achieving success at Zegrze. The course lasts twenty days and already about 300 men have graduated and are now doing efficient work in handling the new equipment.

Our men are now scattered from border to border of the new republic. Experts are setting up mobile steam laundries in eight of the larger cities of Poland to provide cleansing facilities for the poor and needy; hospital repair units and construction units are at work in two of the sanitary bases of the worst infested districts.

Four field columns, motorized sanitary trains of twenty enlisted specialists, under commissioned officers of the American Army, are bathing and delousing at the rate of 800 each daily. Priceless soap and precious underclothes are being distributed as the cleansing process is completed. At the moment these columns are operating in Przedbors, Slomniki, Wlodawa and Lwow. Highly successful results were obtained at Konskie, the first community in which field column operations were attempted, where over 5,000 men, women and children were bathed and deloused.

Hospitalization and quarantine operations are being conducted in Biala, Konsk, Lwow and other places in the south and east of Poland, where there is a stirring need also for food and clothing.

American property purchased by Poland is being distributed as rapidly as it can be convoyed from the yards in Warsaw to the towns and communities designated by the Ministry of Public Health. Approximately ten truck loads of supplies leave Warsaw daily for distribution.

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ACTIVITIES DURING THE PRESENT WEEK

During the present week field columns will be bathing and delousing in the cities of Przedborz, Slomniki, Wlodawa, Lwow (Lemberg), and possibly Chelm. Clothing is badly needed at these places for use after cleansing process is completed.

Supplies will be distributed throughout the districts of Lublin, Kielce, and Lodz.

Automobiles and motor vehicles can be repaired at Zegrze, Lublin, Kielce, Lodz and Biala.

Identity cards have been furnished members of this Expedition. These will be shown upon request.

H. L. GILCHRIST,
Colonel Medical Corps, U. S. A.,
Commanding.

THE MINISTRY OF PUBLIC HEALTH, REPUBLIC OF POLAND HEADQUARTERS
POLISH TYPHUS RELIEF EXPEDITION
UNITED STATES ARMY
WARSAW, POLAND

October 27, 1919.

Bulletin No. 2.

TRANSPORTATION

With the arrival in Warsaw on Thursday, October 23, 1919, of the thirty-second trainload of supplies and equipment for the typhus campaign, the transportation problem, involving over 1,600 cars, has been solved. Through the very efficient offices of Captain Fred Pumphrey, Sanitary Corps, functioning as the Executive Officer of the expedition in Paris, and Major W. H. Donaldson, Coast Artillery Corps, representative of the expedition in Coblenz, the enormous span between the American supply depots of France and the crying need of the typhus stricken of Poland has been bridged. The passage of the large quantity of property across Germany, outlined in Bulletin No. 1, has been smoothy and expeditiously accomplished. Too much credit cannot be given the above-named officers for the excellent work they performed in connection with the organization and overcoming the multitudinous difficulties that constantly crept into the work. Only one who has attempted European trans-continental transportation can fully appreciate the full extent of their labors.

ADDITIONAL PERSONNEL

During the past week a noteworthy addition to the personnel of the expedition has been had. Six additional medical officers and four commissioned officers of the line of the United States Army including the Executive Officer from Paris, have arrived. The detail of the medical officers to some of the many vacancies in the professional administration of the expedition is now being achieved. The need for medical officers is most urgent, especially at this time, when a rapid increase in the number of typhus fever cases is expected.

To date, 31 commissioned officers and 420 enlisted men have arrived in Poland for duty with this Expedition.

FIELD COLUMNS

Flattering reports are being received concerning the activities of the field columns.

At Wlodawa, where much opposition was at first encountered and the assistance

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of the military was required to get the people to the bathing and delousing plant, conditions have so changed that it now requires the assistance of the military to keep them away. The people realize the necessity of the work and are cooperating in every way.

Word has been received from Colonel Snively, Director of Field Operations, that at Lemberg 50,000 people are waiting to be bathed and deloused. Already one column is in the field there, and two others are expected to proceed to that point, weather permitting.

It is to be greatly regretted that winter is so close at hand. From the flattering success already achieved by the columns now in the field it is believed, if this work could have been commenced early in the summer with a large number of columns, the typhus epidemic would now be under control.

ACTIVITIES DURING PAST WEEK

Unfortunately there has been a dearth of gasoline. As a result many of the cars have been laid up and the distribution of supplies restricted. But it is believed this condition will soon be improved. A detachment of the expedition, under a noncommissioned officer, has proceeded to Galicia for the purpose of guarding a trainload of gasoline to be shipped from that field.

MOVEMENT OF MOTOR SCHOOL AND REPAIR SHOP

In view of the fact that the military have requisitioned the barracks and grounds now occupied by this command at Zegrze, it will be necessary for the organization to be moved to other quarters. Additional barracks have been secured on this side of the River Bug, about a mile from the present location. Here the headquarters of the organization will be located. The Motor Repair Park and the Chauffeurs and Mechanics School will be located at Praga, a suburb of Warsaw.

The new quarters were selected after several days of careful search throughout Warsaw and the vicinity, and the possibilities presented in the new plant will add greatly to the efficiency of the work. A modern factory site which has been idle is being transformed into an up-to-date repair and overhaul shop and park, with adequate floor space and facilities for carrying on all sorts of automobile and steam sterilizer repair work. This shop, when thoroughly organized, will be the most complete of its kind in Poland and will include the following departments:

	Personnel
Packard truck repair shop	20
Ford repair shop	14
Motor repair shop	6
Spare parts and storage	4
Radiator, blacksmithing and welding	5
Body repairing and painting	4
Vulcanizing department	2
Salvage	2
Magneto and electrical department	1
Steam sterilizer repair shop	4

It will require approximately sixty men to operate all departments and it is planned by the first of December to have the organization complete in every detail and ready to turn over to a like number of Poles, many of whom are now being instructed by members of this command for such duties.

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ALLIED CONTROL OFFICE

Under the direction of the Military Attaché of the American Legation, an Allied Control Office for the administration of problems of police of allied soldiers on the streets of Warsaw is being established. French or American soldiers against whose conduct in public places charges are made will be referred to this office for disposition; officers or men without billets may seek the aid of this office; traffic regulations will be enforced, in so far as it pertains to allied vehicles, by this office; general matter of inter-allied administration of personnel will in every case be disposed of by this office, from which place proper reference to organizations concerned will be had.

ACTIVITIES DURING COMING WEEK

Field columns will be bathing and delousing in the cities of Przedborz, Slomniki, Wlodawa and Lwow (Lemberg).

Supplies will be distributed throughout the districts of Lublin, Kielce, and Lodz, as soon as transportation facilities permit.

Automobiles and motor vehicles can be repaired at Lublin, Kielce, Lodz and Biala.

The movement of the motor repair shops and school from Zegrze to Praga will occupy the major portion of the week.

H. L. GILCHRIST,
Colonel, Medical Corps, U. S. A.

THE MINISTRY OF PUBLIC HEALTH, REPUBLIC OF POLAND HEADQUARTERS

AMERICAN POLISH RELIEF EXPEDITION

UNITED STATES ARMY

WARSAW, POLAND

Bulletin No. 3. *November 15, 1919.*

PERSONNEL

The following officers of the United States Army are now on duty with this Expedition in Poland:

Colonel H. L. Gilchrist	Medical Corps.
Lieutenant Colonel Lee R. Dunbar	Medical Corps.
Lieutenant Colonel E. C. Register	Medical Corps.
Major Willis P. Baker	Medical Corps.
Major Frank H. Dixon	Medical Corps.
Major Francis M. Fitts	Medical Corps.
Major R. W. Riefkohl	Coast Artillery Corps.
Captain J. P. Crawford	Medical Corps.
Captain Rudolph Delehanty	Field Artillery.
Captain James D. Edgar	Medical Corps.
Captain Joseph G. Fernbach	Medical Corps.
Captain Howard J. Gorman	Infantry.
Captain Charles N. Harper	Medical Corps.
Captain Robert W. Hasbrouck	Coast Artillery Corps.
Captain Clyde H. Morgan	Coast Artillery Corps.
Captain Desmond O'Keefe	Field Artillery.
Captain Samuel J. Rhode	Dental Corps.
Captain Robert C. Snidow	Coast Artillery Corps.
Captain Harry Y. Stebbins	Field Artillery.
Captain Paul H. Strait	Medical Corps.
First Lieutenant Frank A. Allen	Field Artillery.

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First Lieutenant Harold L. R. K. Albro.....Cavalry.
First Lieutenant Arthur E. Fox.....Field Artillery.
First Lieutenant J. M. Gillespie.....Coast Artillery Corps.
First Lieutenant Emil Krause.....Infantry.
First Lieutenant Paul B. Matlock.....Infantry.
First Lieutenant John C. Moses.....Field Artillery.
First Lieutenant Louis L. Shook.....Veterinary Corps.
First Lieutenant James G. Strobridge.....Cavalry.
Second Lieutenant Bryan Evans.....Field Artillery.
Second Lieutenant Alfred M. Bergman.....Field Artillery.

On duty with this expedition as liaison officer in Coblenz, Germany:

Major W. H. Donaldson.....Coast Artillery Corps.

EXPEDITION TO CARRY ON

The following telegram was received last Sunday:

Request of Herbert Hoover that Colonel Gilchrist Medical Corps and other army personnel continue on duty in Poland in anti-typhus campaign approved by Secretary of War. Only such enlisted personnel to be retained as will volunteer to stay in Poland until next spring.

It is interesting to note that all officers of the command but two have expressed a desire to remain on duty in Poland, and that a majority of the enlisted men also volunteered their continued service. It is planned to retain but 150 enlisted men and 30 commissioned officers.

FIELD COLUMNS

Due to the early appearance of the wintry weather and the accompanying blizzard, field operations have had to be discontinued. Personnel and equipment of the field columns have been ordered to the following cities:

Field Column No. 1, Radom; Field Column No. 2, Krakow; Field Column No. 3, Lublin; Field Column No. 4, Lwow (Lemberg).

The success attained by these columns, during the brief time they were in the field in the most severely infested sections of the country, has been most satisfying. Over 28,000 men, women and children have been bathed and deloused and over 2,000 suits of new underwear and 2 tons of soap have been distributed. It is also believed that the educational effects of the visitations of these columns are beyond estimation. The eagerness with which the baths were always received alone establishes the fact of their popularity and efficiency. At the first thaw of spring even more extensive operations of field columns will be recommenced, when it is contemplated to put forty in the field.

It is also most interesting to note that no cases of typhus fever have occurred in the sectios of the country in which field columns have operated.

QUARANTINE CORDON ALONG THE EASTERN BORDER

Five medical officers, members of this expedition, have been assigned to the quarantine stations and military cordon along the eastern border. Every effort is being made to strengthen this cordon, and to that end a more strict quarantine is being placed along the border in order to prevent the large influx of refugees from entering Congress Poland prior to having been bathed and deloused.

The following medical officers, United States Army, and members of this expedition, have been assigned to this important work with stations as follows:

Lieutenant Colonel E. C. Register, Tarnopol; Captain James D. Edgar, Brzesc-

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Litewski; Captain Joseph G. Fernbach, Dorohusk; Major Willis P. Baker, Oswiecim; Captain Paul H. Strait, Bialystok.

Liaison has been effected with the American Red Cross and the European Children's Fund Administration, A. R. A. Through the good services of these organizations clothing, milk and food are being sent to the quarantine station at Dorohusk, where conditions are bad.

TRANSPORTING FOOD

Due to the premature arrival of winter, the food situation in many parts of Poland is becoming acute, especially as regards transportation. To relieve this condition, personnel and trucks are being used for this important work, it being realized that typhus fever and food distribution must be handled together.

MOTOR REPAIR AND SUPPLY BASES

The large motor repair shop at Praga is rapidly being put into shape and will soon be ready for making all kinds of repairs. Throughout the winter, motor bases will be operating at Lublin, Kielce, Lodz and Praga. Repairs of all sorts can either be effected at these stations or referred to that particular base at which the work can more thoroughly be done.

MOTOR TRANSPORTATION

Snow having rendered the outlying roads practically impassable, motor transportation has been temporarily curtailed. Throughout the winter, as now, every effort will be expended to accomplish motor communication throughout Poland, but it must be remembered that at times the highways of this country will be rendered absolutely impassable. Such transportation as strenuous effort and Amreican ingenuity can effect will be maintained.

MOVEMENT OF RETURNING PERSONNEL

The first American military transport that ever departed from Poland will leave Warsaw on November 22. It will carry the returning 265 enlisted men and the five commissioned officers from Warsaw to Coblenz, Germany. Details for this movement are in experienced hands and every possible convenience and comfort will be provided for the extended trip.

MORE EQUIPMENT ARRIVES

Under the convoy of a commissioned officer and three American soldiers, seven more carloads of supplies have arrived in Warsaw.

DENTAL SURGEON

Captain Samuel J. Rhode, Dental Corps, U. S. A., is a member of this Expedition and has now received equipment with which he is enabled to perform ordinary dental treatment.

H. L. GILCHRIST.

GOVERNMENT POSITIONS IN OCCUPATIONAL THERAPY

The United States Civil Service Commission has announced examinations for field supervisor of reconstruction aides in occupational therapy, at $1,800 a year; superintendent of aides in occupational

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therapy, at $2,400 a year; special instructor in occupational therapy, at salaries ranging from $1,200 to $3,500 a year, and reconstruction aide, at salaries from $720 to $960 a year. Reconstruction aides will also receive quarters, subsistence and laundry. Appointees to all positions whose compensation does not exceed $2,500 a year will receive the increase of $20 a month granted by Congress if their services prove satisfactory. In all about 500 positions in the Public Health Service throughout the United States, and at St. Elizabeth's Hospital (insane), Washington, D. C., will be filled.

The examinations for field supervisor of reconstruction aides and superintendent of aides will be held on February 24. The other examinations will be open until further notice. Both men and women, if qualified, will be admitted, but appointing officers have the legal right to specify the sex desired when requesting certification of eligibles.

None of the examinations require competitors to assemble in an examination room for tests. The ratings will be based upon the elements of education, training and experience and upon a written discussion on one of a number of given topics connected with the work.

Further information and application blanks may be obtained from the representative of the Civil Service Commission at the post office or customhouse in any important city, or by communicating with the United States Civil Service Commission, Washington, D. C.

FEDERAL LAW RELATING TO MARKING THE "COUNTRY OF ORIGIN" ON IMPORTED ARTICLES

We publish the following letter and extract of the Federal Law as a matter of interest to those who use surgical instruments, and because we believe, in addition to the fact that laws were designed to be obeyed, that the manufacturer is entitled to just protection and the buyer to the assurance that he gets what he pays for.—THE EDITOR.

GEORGE P. PILLING & SON CO.
MANUFACTURERS OF
SURGICAL INSTRUMENTS
N. E. CORNER, ARCH AND 23RD STREETS
PHILADELPHIA, PA., *January* 19, 1920.

"MILITARY SURGEON,"
Colonel James R. Church,
7th and B Sts., S. W., Washington, D. C.

MY DEAR COLONEL CHURCH:

Saturday afternoon last the writer called at your office, but unfortunately found you out. Your letter of January 7 was held awaiting my visit to Washington, as I

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wished to explain to you verbally the great unfairness that is being done to the surgical instrument trade of this country.

You, of course, are aware how the various manufacturers in the United States did everything in their power to build up their plants in order to make surgical instruments for the war. If you are not familiar with this subject, ——— ———, we are sure, will be very glad to give you any desired information.

There is no question in our minds but what large numbers of surgical instruments imported from other countries have had the country of origin removed in order to create the impression with the surgeon that these goods were made in America. As an illustration we quote below paragraph 3 of a letter from ——— ———, which reads to us as though it was an invitation to import these instruments ready to plate and then before they are plated that the name can disappear from the instrument.

Extract from letter of ——— ———

> "On this plan we handle two grades of instruments, the finished and unfinished instrument or instrument in the black unnickeled. The advantage in the unfinished instrument is that the name Japan or Nippon will not appear when you complete it and any slight defects can be corrected by you. The unfinished instrument runs from ten to twenty cents cheaper than the completed article."

A few days ago we received a letter from a retail instrument house who had been asked to quote on American-made instruments. They did so, but they state they have every reason to think the instruments that were sold in competition with their own and at a lower price were imported goods from which the country of origin had been removed. It is very difficult indeed to positively make the assertion and specify definite dates and definite instruments, but in the minds of very many of the instrument people of this country it is the same belief that this practice is current, therefore it is thought that by making a reprint of the law on this subject and distributing it to the various surgical instruments dealers the situation would be improved.

Trusting you will give us favorable editorial notice in your early edition, we are,

Yours very truly,

G. P. Pilling & Son Co.

C. J. Pilling,

President.

P. S.: Since writing the above we have learned that in one of the western cities the Federal authorities have made an investigation and found that the imported surgical instruments did have the country of origin on, that this country of origin was removed by this dealer in a western city and that the matter has now been turned over to the United States District Attorney.

Copy of the Federal Law Relating to Marking the "Country of Origin" on Imported Articles

United States Tariff Act of 1913, Sec. 4, Par. F, Subsection 1

That all articles of foreign manufacture or production, which are capable of being marked, stamped, branded, or labeled, without injury, shall be marked, stamped, branded, or labeled in legible English words, in a conspicuous place that shall not be covered or obscured by any subsequent attachments or arrangements, so as to indicate the country of origin. Said marking, stamping, branding, or

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labeling shall be as nearly indelible and permanent as the nature of the article will permit.

All packages containing imported articles shall be marked, stamped, branded, or labeled so as to indicate legibly and plainly, in English words, the country of origin and the quantity of their contents, and until marked in accordance with the directions prescribed in this section no articles or packages shall be delivered to the importer.

Should any article of imported merchandise be marked, stamped, branded, or labeled so as not accurately to indicate the quantity, number, or measurement actually contained in such article or package, no delivery of the same shall be made to the importer until the mark, stamp, brand or label, as case may be, shall be changed so as to conform to the facts of the case.

The Secretary of the Treasury shall prescribe the necessary rules and regulations to carry out the foregoing provision.

Copy of the Federal Law Relating to the Removal of the "Country of Origin" from Imported Articles

United States Tariff Act of 1913, Sec. 4, Par. F, Subsection 2

If any person shall fraudulently violate any of the provisions of this act relating to the marking, stamping, branding, or labeling of any imported articles or packages; or shall fraudulently deface, destroy, remove, alter, or obliterate any such marks, stamps, brands, or labels with intent to conceal the information given by or contained in such marks, stamps, brands, or labels he shall upon conviction be fined in any sum not exceeding $5,000, or be imprisoned for any time not exceeding one year or both.

CASH FOR BACK NUMBERS

We will pay twenty-five cents each for copies of THE MILITARY SURGEON for August, 1918, if in good condition.

Address

The Association of Military Surgeons of the U. S.,
Army Medical Museum, 7th and B Streets, S. W.,
Washington, D. C.

REMEMBER THAT OUR NEXT ANNUAL MEETING IMMEDIATELY PRECEDES THAT OF THE A. M. A. AT NEW ORLEANS. BETTER MAKE IT A POINT TO COME TO BOTH.

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BOOK REVIEWS

WHAT WE KNOW ABOUT CANCER.[1]—A Handbook for the Medical Profession. Prepared by a committee of the American Society for the Control of Cancer, American Medical Associated Press. Chicago: 1918.

The American Society for the Control of Cancer has been in existence and working effectively for a number of years. The sole object of the society, at present at least, is the "dissemination of facts in regard to cancer to the end that its mortality may be reduced by a wider knowledge of the disease."

The effort represented by the present pamphlet has perhaps the most far-reaching possibilities for good of any single attempt to lessen cancer mortality undertaken in this country.

It is no longer necessary to argue the point that delay is the one great factor in cancer mortality. At least four-fifths of cancer deaths could be prevented by early recognition. The conditions necessary for recognition of cancer in ample time for cure are not ideal but distinctly practicable. Public education is one important pathway of improvement, but education of the medical profession itself is of equal, if not greater, importance. Statistical studies have shown that in the majority of cases the doctor has had the cancer patient "under observation" over a year before efficient curative treatment is instituted. It is needless to state that during this year the majority of cases have changed from curable to incurable. As the pamphlet itself somewhat mildly puts it, "The conditions call for a far keener appreciation of responsibility for the mortality from cancer than now generally exists in the medical profession."

It is not possible here to abstract this pamphlet, which is already so condensed. The general facts concerning cancer are outlined, and then each important type and site of cancer is taken up in detail and the forms, symptoms, standard treatment, and results to be expected are outlined for each type.

The chief point we would make here is that if every medical man would study and seriously apply the teaching in this pamphlet, which he can read in an hour, the question of delay in cancer would be solved in so far as it is referable to the medical profession. The ultimate possible good obtainable from the widespread dissemination of this pamphlet is so great that we would urge every possible means to get it into the hands of as many medical men of all classes as possible. It can be had from the American Medical Association, 535 N. Dearborn St., Chicago, for 10 cents. If you are a trained surgeon, get it. It will interest you. If you are further afield, get it and study and apply it. If you feel misgivings that some of your cases in the past might have been saved had you been more sure and acted more promptly (and who of us does not have such misgivings), get it. It will help you in future cases.

We would especially beg the assistance of boards of health, both state and municipal, and of medical societies in distributing the pamphlet. It can be bought cheaper in quantities and sent out with your other mail matter with almost no extra cost or trouble. When such a simple means for such far-reaching good is in our hands it is a pity to let it lie neglected.

UROLOGY, by Victor Cox Pedersen, A.M., M.D., F.A.C.S., Major, Medical Reserve Corps, United States Army; Consulting Physician to the Selective Service Headquarters in the city of New York; Member of the Council of National Defense, New

[1]Published by request of The American Society for the Control of Cancer.

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York State Committee, Medical Section; Visiting Urologist to St. Mark's Hospital; Member of the American Urologist Association, American Medical Association, New York State and County Medical Societies, New York Academy of Medicine, American Electrotherapeutic Association, the Association of Military Surgeons of the United States, and of the Committee on Venereal Diseases of the Advisory Council of the Department of Health of New York City. Illustrated with 362 engravings, of which 152 are original and 13 colored plates. Philadelphia and New York: Lea & Febinger. Price, $7.00.

This book represents the experience of many years in urological departments in New York City, in private practice and in the author's clinic at St. Mark's Hospital. It is planned so that both students and practitioners receive a clear, practical word-picture of the important affections.

On page 57 is a copy of a leaflet which the author places in the hands of his patients suffering from gonorrhea. It serves to give a brief, intelligent idea of this communicable disease and should prove of value in securing the coöperation of the patient in management and treatment

Chapters VIII and IX are of unusual value. They take up the general principles of diagnosis and treatment.

Cystoscopy is considered in Chapter XIII, with a number of valuable suggestions.

H. F. Strine.

Applied Anatomy and Kinesiology.—The Mechanism of Muscular Movement by Wilbur Pardon Bowen, M.S., Professor of Physical Education, Michigan State Normal College. Second edition. Price $3.50. Pp. 354, with 197 illustrations. Philadelphia: Lea & Febiger, 1919.

The author in defining Kinesiology gives it a broad definition. He says: "It includes the study of the principles of muscular exercises, with inquiry as to how they are performed, how they react on the body, and their relation to the problems of bodily development, bodily efficiency, and the prevention and cure of certain defects and deformities." He says that "to make such study it is necessary to analyse complex movements into their simple elements, to note carefully what bones, joints, and muscles are involved, what part each muscle has in the work, and under what mechanical conditions its work is done."

In order to do this he has divided his book into five parts. Part One, General Principles—The Treatment of Muscular Structure and Action—includes a description of the joints, the study of bones as levers, and a simple explanation of the muscular control by the nervous system. Part Two discusses the upper limb, commencing with the movements of the shoulder girdle, which in man is described as consisting of two bones, the clavicle and scapula. He takes up, in succession, the movements of the shoulder joint, elbow, fore-arm, wrist and hand.

There are chapters devoted to the movements of the lower limb, also to the trunk; these latter explaining the movements of the spinal column, breathing, and the maintaining of the upright position, and how defects in posture may come about.

In the last part of the book General Kinesiology is taken up. It explains teamwork among muscles; gymnastic movements; which muscles are brought into action in many of the different plays, games, sports, and industrial occupations. The idea of all this, of course, is the proper development and position of the muscles and the skeleton.

The reviewer believes that this book would make a valuable one for medical officers to study, and perhaps for use as a text in instructing those who are respon-

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sible for the carrying out of our setting-up exercises in the Army. The why and wherefore of many of these exercises can be readily understood by a reference to Professor Bowen's book. This would also be an excellent text from which instructors in physical education in our different universities and colleges might better inform themselves and systematize their methods of instruction.

The study of muscular and body movements could in addition to such a text, be well illustrated by moving pictures rapidly taken, thirty or forty per second, and shown at the usual rate of speed.

JNO. E. SUMMERS.

THE SURGICAL CLINICS OF CHICAGO, Volume III, Number 4 (August, 1919) and Number 5 (October, 1919). Philadelphia and London: W. B. Saunders Company. Published bi-monthly. Price per year: Paper, $10.00; cloth, $14.00.

These two numbers continue the same standard of excellence as that in the others which have preceded them during the year. We find that about one-half of the articles are contributed by the same men. As is to be expected, a great difference is noted in the style of the contributions, some being of the text-book or monograph type; others, case reports; while there are a few which are upholding the reputation of Chicago as the leading clinical surgical center, distinguished by the late Moses Gunn, Charles T. Parks, Nicholas Senn, and John B. Murphy.

In the numerous medical journals which, weekly, monthly, or quarterly, reach the desk of the reviewer, he does not recall having noted a single contribution of the type of a medical or surgical clinical lecture. Formerly these lectures were not uncommon and were of great value. Too many articles appearing in the current medical press are hardly worth the time given them by their contributors, and surely not worth that of their expected readers; therefore many are not read at all. The subjects of which they are composed can be found better done in text-books, monographs, and hospital reports. From an economic point of view they are not worth while.

Certainly no one can read the Chicago Surgical Clinics without absorbing useful knowledge and having his clinical sense made more acute.

JNO. E. SUMMERS.

LEÇONS DE CHIRURGIE DE GUERRE, by MM. Guillain, Jeanbrau, Lecène, Lemaitre, Leriche, Magitot, Mocquot, Nogier, Okinczyc, Piollet, Policard, Roux-Berger, Tissier. Published by Masson and Co., Paris, 1918. Price, 9 fr. (+10 per cent).

This series of lectures by some of the most experienced and best known French surgeons, each having made a name for himself in the subject of which he writes, impresses the reviewer as perhaps the clearest exposition of war surgery which has appeared in book form.

Early in the war the Centre de Bouleuse, because of its being a favorable place near the front, was chosen as a kind of university for the instruction of medical men in all the phases of military medicine and surgery. The original lectures have been elaborated somewhat, and in their present form are very complete; the opinions expressed in them differ little from those generally accepted by English and American surgeons.

The contributors and subjects of these lectures are: P. Lecène, Principles of the Surgical Treatment of War Wounds; A. Policard, General Pathological Anatomy and

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Physiology in the Repair of War Wounds; H. Tissier, Bacteriology of Wounds; P. Lecène, Tetanus; C. Jeanbrau, Anemia and Transfusion; Th. Nogier, The Radioscopic Procedures for the Removal of Projectiles, Applicable in the Formations at the Front; René Lemaitre, Primary Suture; P. Poillet, Disinfection and Secondary Suture; Pierre Moquot, Amputations; René Leriche, Wounds of the Articulations, Fractures of the Diaphyses, Orthopedics; M. Okinczyc, Wounds of the Abdomen; J. L. Roux-Berger, Wounds of the Pleura and of the Lung; P. Lecène, Immediate Treatment of Wounds of the Head; G. Guillain, The Secondary Complications of Wounds of Nerves; A. Magitot, Ocular Wounds.

The illuminating style of these writers is refreshing, characterized by its to-the-point and absence of repetition and prolixity.

JNO. E. SUMMERS.

PLASTIC SURGERY, ITS PRINCIPLES AND PRACTICE, by John Staige Davis, Ph.B., M.D., F.A.C.S., Instructor in Clinical Surgery, Johns Hopkins University; assistant visiting surgeon, Johns Hopkins Hospital; visiting surgeon and plastic surgeon to the Union Protestant Infirmary, the Hospital for the Women of Maryland, and the Children's Hospital School, Baltimore, Md.; Fellow of the American Surgical Association, the Southern Surgical Association, etc. The book has 864 illustrations, containing 1,637 figures. Philadelphia: P. Blakiston's Son & Co. Price, $10.00.

Doctor Davis has written a book, the principles and practice of which are based on an extensive personal experience added to a most thorough knowledge of the work of others. Previous to the Great War surgeons were fairly familiar with plastic surgery as treated of in general text-books, but no book worth while, of this special subject, had been published in English. Those who are fortunate enough to have visited the Army and Navy Exhibit at the last meeting of the American Medical Association at Atlantic City will recall a remarkable set of figures and drawings illustrative of what was being accomplished by our own surgeons in repairing some of the frightful disfigurements of war wounds. It was a revelation. The writer does not recall the names of the gentlemen whose work was responsible for this exhibit, but they must have been men who had worked along the same line as has Doctor Davis, and had had opportunities to study the brilliant technique of some of our English and French surgeons who have contributed so largely towards what is best in plastic surgery.

Nothing seems to have been omitted in this book. There are twenty-five chapters including an Historical Review; Prosthesis; Transplantation of Skin and other Tissues; Different Kinds of Flaps; the Treatment of Wounds, Intractable Ulcers, and Varicose Veins, Scars and Keloids, many kinds of mal-formations, as Harelip and Cleft Palate, Exstrophy of the Bladder; Epispadias and Hypospadias; Atresia of the Vagina. Regional Plastic Surgery is then taken up, particularly that of the eye-lids, ears, nose, jaws, lips, and cheeks; and finally the Surgery of the Neck, Trunk and Extremities. All of these subjects will be found discussed in good, plain English, and illustrated with drawings and photographs which are comprehensible and instructive. At the end of each chapter will be found an extensive bibliography.

There are very few conditions of which we can think, where plastic surgery is applicable, which cannot be found discussed in this work.

JNO. E. SUMMERS.

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QUARTERLY MEDICAL CLINICS. Volume 1, Number 2. Medicine and Surgery Publishing Company, Inc., Metropolitan Bldg., St. Louis, Mo.

This is a compact volume of some two hundred odd pages and contains a review of 13 cases suffering from varied ailments. These are indexed according to symptomatology and also in accordance with diagnosis, so that as a matter of fact comparison of the two tables of contents furnishes one in the first with the symptomatology and the second with a completed diagnosis after detailed examination of the case. The arrangement is systematic, so that the reader has the advantage of following the same routine in each case presented.

As an example of the diversity of the contents we quote among the 13 cases which compose the subject matter, the following cases:

"CASE XVI. Epidemic Encephalitis ('Sleeping Sickness,' 'Lethargic Encephalitis') Chronic, Non-active, Peptic Ulcer."

"CASE XIX. Peptic Ulcer Complicated by Recent Gastrorrhagia; Lues."

"CASE XXV. Deep Urethral Obstruction Caused by Carcinoma of the Prostate Resulting in Enormous Dilation of the Urinary Bladder. General Arteriosclerosis with Arterial Hypertension, Cardiac Hypertrophy and Intestinal Nephritis; Chronic Pancreatitis."

"CASE XXVIII. Advanced 'Hemolytic' or 'Pernicious' Anemia. Abscesses of the Roots of the Teeth; Chronically Infected Appendix and Gall-Bladder; Splenitis and Perisplenitis."

The sub-titles have not been added to the above but enough indicated to show that the "Clinics" are not confined to any one particular type of disease. Detailed notes on clinical and laboratory procedures are distinctive of these "Clinics" and are very suggestive as to the proper and thorough manner of reaching a diagnosis in regard to many pathologic conditions. The summary of etiology and treatment together with the sections on the technique of diagnostic and therapeutic procedures is concise and and in accordance with modern views. The material is presented in a manner so clear as to be easily assimilated by students and there is no question but what it must be of much value to the general practitioner in keeping up with the advance of modern procedure. As well as the presentation and analysis of the cases which form the subject matter of the volume, the discussion following these as to treatment, prognosis, etc., is of much value and represents the practice of today in respect to the treatment of the disease condition under discussion.

The book is generously illustrated, the illustrations are clear and well produced. They embrace tables as well as reproductions of photomicrographs and illustrations showing gross conditions and certain apparatus used in connection with diagnosis or treatment. The volume should be of interest to any practitioner who seeks an orderly exposition of the symptoms of a given case and a logical discussion as to diagnosis, prognosis and treatment.

J. R. C.

A MANUAL OF HYGIENE AND SANITATION, by Seneca Egbert, A.M., M.D. Seventh edition, enlarged and thoroughly revised. Illustrated with 160 engravings and 5 plates. Philadelphia and New York: Lea & Febiger, 1919. Price, $3.00.

In this seventh edition Dr. Egbert has brought his book up to date with the recent advances in sanitary science. With the increased importance which sanitation is assuming in medicine the book is acceptable and timely. Certain parts of it have more historical value possibly than practical application, as, for example, the accounts of the outbreaks of typhoid at Plymouth and at Altona and Hamburg.

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With the growing prevalence of inoculation against typhoid and the decrease of this disease as an epidemic, instances of wholesale infection such as the two quoted must have a value more from the standpoint of what occurred in the darker ages than what can happen now in the time of our enlightenment.

Special attention is given in this work to chapters on Sewage Disposal, Industrial Hygiene, and Military Hygiene. The first of these is timely, for it has not been so many years since exact information on this subject was difficult to obtain in printed form. We remember when it was not an easy matter to obtain any working plans or specifications of even the septic tank system of sewage disposal. Industrial hygiene, under national and state laws, assumes far and away more importance than in even the recent past. After our participation in the recent war the subject of military hygiene is one which concerns not only those who in their service in this country or overseas have been intimately concerned with its application but those who carry the lessons learned there back into civil practice. The illustrations are ample, and the book is compact and well gotten up. Dr. Egbert's past service with the colors has qualified him to speak not only from the standpoint of the hygienist in general, but from the point of view of one who has had these problems to meet in campaign.

J. R. C.

HYGIENE AND SANITATION, a Text-book for Nurses, by George M. Price, M.D. Third edition, revised and enlarged. Philadelphia and New York: Lea & Febiger. Price, $1.75.

In this Dr. Price has amplified his work in the earlier editions. The book now contains 253 pages and is divided into seven chapters, the titles of which are as follows: Introduction to the Study of Hygiene, The Hygiene of Habitations, The Hygiene of Foods and Food Supply, The Hygiene of Schools and School Children, The Hygiene of Occupation, Infectious Diseases and Their Prevention, Personal Hygiene. The chapter on Infectious Diseases is new and those on Personal Hygiene and School Hygiene considerably elaborated.

The work does not deal with topics relating to the care and treatment of diseased persons as covered in the course in training schools. Its design is to teach the elements of hygiene in the various branches, and it is valuable to the graduate nurse as a book of reference as well as a text-book.

J. R. C.

THE NARCOTIC DRUG PROBLEM, by Ernest S. Bishop, M.D., F.A.C.P., Clinical Professor of Medicine, New York Polyclinic Medical School; Member Narcotic Committee, Conference of Judges and Justices of New York State; Committee on Habit Forming Drugs, Section on Food and Drugs, American Public Health Association, etc. New York: The Macmillan Company. Price, $1.50.

From the list of titles which follows the name of the author, it is quite evident that he is qualified to speak *ex cathedra* on the subject on which he writes. We note in his preface his distinct disavowal of the rôle of the specialist, and this puts us in mind of the trial in which expert testimony was offered. After three specialists had proven their qualifications and testified, another medical man was called to the stand and, upon being asked by the presiding judge as to whether he was a specialist or not, stated emphatically that he was a general practitioner. Upon further inquiry from the judge as to what the difference was between a general

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practitioner and a specialist he replied that it took about thirty-seven specialists to make one general practitioner.

However this may be, there is no question from either side as to Dr. Bishop's ability to deal with the subject which he has chosen. The book comprises ten chapters, the titles of which are as follows: Introduction; Fundamental Considerations; The Nature of Narcotic Drug Addiction-Disease; The Mechanism of Narcotic Drug Addiction-Disease; Remarks on Methods of Treating Narcotic Drug Addiction; The Rational Handling of Narcotic Drug Addiction-Disease; Relation of Narcotic Drug Addiction to Surgical Cases and Intercurrent Diseases; Laws, and Their Relations to Narcotic Drugs; Some Comments upon the Legitimate Use of Narcotics in Peace and War; General Survey of the Situation and the Need of the Hour; Appendix; Human Documents—Statements of Sufferers from Narcotic Drug Addiction-Disease.

Chapters 5, 6 and 8 are of particular interest. The book is compact in form and well worth the consideration of anyone who has to deal with this form of disease.

J. R. C.

FOOD FOR THE SICK AND THE WELL, How to Select It and How to Cook It, by Margaret P. Thompson, Registered Nurse. Cloth, ix+82 pages. Yonkers-on-Hudson, New York: World Book Company. Price, $1.00.

The housewife as well as the physician and the nurse will find in this volume a valuable help and guide. The text discusses the relation of food to health and the necessity of a balanced menu.

There are receipts for breakfast cereals, breads, eggs, soups, meats, fishes, cereals and starchy vegetables, green vegetables, salads and desserts, cakes, albuminous drinks, jellies, canned fruits, and cheese dishes.

An index of several pages will enable people to find what they are looking for in a hurry.

LES LESIONS DES NERFS, by Mme. Athanassio-Benisty. Illustrated. Masson et Cie Editeurs, Libraires De L'Academie De Medecine, 120 Boulevard Saint-Germain, Paris.

This is the second volume of two by Mme. Athanassio-Benisty, House Physician to La Salpetriere, "The Treatment and Repair of Nerve Lesions."

This includes a study of the anatomical and histologic changes; the signs and symptoms of the serious lesions, especially those due to the complete section of nerves and gives the signs indicative of the motor, sensory and electrical restoration of function. Further it takes up localization methods, the joint disturbances consequent upon nerve lesions such as contractures and the rare forms of paralyses and deformities. All methods of treatment that have been in actual use during the war have been adequately described.

The indications for surgical intervention and physical therapy have been well presented.

Of particular interest is the chapter pertaining to orthopedic apparatus, the ingenuity of which is so well known by those who have been in the military service, that comment seems unnecessary.

This represents a condensation of the results and conclusions made by Mme. Athanassio-Benisty as a consequence of her work for several years as an associate of Professor Pierre Marie. This, with the previous volume, "The Clinical Forms of Nerve Lesions," forms a comprehensive treatise on the subject and should be invaluable not only to the neurologist but to the physician who has not had the opportunity of special training in neurology.

ROBERT FRANCIS SHEEHAN.

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BOOKS RECEIVED

Books received are acknowledged in this department and such acknowledgment must be regarded as a sufficient return for the courtesy of the sender. Selections will be made for review in the interest of our readers and as space permits.

RIOTS AND RIOT DUTY, by Edward S. Farrow, late Assistant Instructor of Tactics, U. S. Military Academy, West Point, 1919. Asbury Park, N. J.: The Military-Naval Book Corporation. Price, 50c each; $5 per dozen.

SHELL-SHOCK AND OTHER NEUROPSYCHIATRIC PROBLEMS PRESENTED IN FIVE HUNDRED AND EIGHTY-NINE CASE HISTORIES FROM THE WAR LITERATURE, 1914-1918, by E. E. Southard, M.D., Sc.D., 1919. Boston, Mass.: W. M. Leonard, Publisher. Price, $10.

THE SURGICAL CLINICS OF CHICAGO. Vol. III, No. 6. December, 1919. Philadelphia and London: W. B. Saunders Company. Paper, $10.00; Cloth, $14.00 per year. Published bi-monthly.

THE NARCOTIC DRUG PROBLEM, by Ernest S. Bishop, M.D., F.A.C.P. New York: The MacMillan Company, 1920. Price, $1.50.

THE SURGICAL CLINICS OF CHICAGO, August, 1919. Vol. 3, No. 4. Philadelphia and London: W. B. Saunders Company.

THE ARMY BEHIND THE ARMY, by E. Alexander Powell, New York: Charles Scribner's Sons.

IDO, Exhaustive Text-book of the International Language of the Delegation and Fundamentals of an Artificial International Language, by Dr. Max Talmey. New York: Ido Press, 1919.

A MANUAL OF HYGIENE AND SANITATION, by Seneca Egbert. Seventh edition, illustrated. Philadelphia and New York: Lea & Febiger, 1919. Price, $3.00.

EXPERIMENTAL PHARMACOLOGY, by Hugh McGuigan, Ph. D., M.D. Illustrated. Philadelphia and New York: Lea & Febiger, 1919. Price, $2.75.

HYGIENE AND SANITATION, A Text-book for Nurses, by Geo. M. Price, M.D. Third edition. Philadelphia and New York: Lea & Febiger, 1919. Price, $1.75.

THE SURGICAL CLINICS OF CHICAGO, October, 1919. Vol. 3, No. 5. Philadelphia and London: W. B. Saunders Company.

DISEASES OF THE NERVOUS SYSTEM, by Jelliffe & White. Philadelphia and New York: Lea & Febiger, 1919.

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Obituary

Those of our membership whose deaths have been noted since our last report are as follows:

Col. P. D. Barnhill, Medical Corps, United States Army.
Maj. William G. Bissell, Medical Corps, New York National Guard.
Capt. Paul B. Coble, Medical Corps, United States Army.
Lieut. Col. Julius Francis Henkel, Medical Corps, United States Army.
Col. John Van R. Hoff, Medical Corps, United States Army.
Lieut. Justin A. McCarthy, Medical Corps, U. S. N. R. F.
Dr. Malcolm McKinnon.
Capt. G. H. Rathbun, Medical Corps, United States Army.
Capt. Thomas H. Seay, Medical Corps, United States Army.
Col. R. M. Thornburg, Medical Corps, United States Army.

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"Tell me thy company and I will tell thee what thou art."

WE should like you to apply this test to Ivory Soap. Ivory Soap's friends include the following:

Doctors and nurses use Ivory Soap. Medical practice requires aseptic cleanness. The purer a soap the more nearly does it produce aseptic cleanness.

Athletes use Ivory Soap. After exercise the pores are wide open and the skin is irritated easily. Soap must be exceedingly mild to give satisfaction at this time.

Mothers use Ivory Soap in the nursery. The tenderest thing in the world is the skin of a new baby. Nothing but the highest quality of soap can be used safely.

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WILLIAM P. C. BARTON, M.D., SURGEON, U. S. NAVY, CHIEF OF THE BUREAU OF MEDICINE AND SURGERY, SEPTEMBER 2, 1842, TO APRIL 1, 1844.

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THE
MILITARY SURGEON

VOL. XLVI MARCH, 1920 NUMBER 3

ORIGINAL ARTICLES

Authors alone are responsible for the opinions expressed in their contributions

WILLIAM PAUL CRILLON BARTON (1786-1856), SURGEON, UNITED STATES NAVY—A PIONEER IN AMERICAN NAVAL MEDICINE [1]

BY CAPTAIN FRANK LESTER PLEADWELL
Medical Corps, United States Navy

(With two illustrations)

WHEN it was suggested as appropriate that the United States Navy should be represented in the list of authors contributing articles to the Anniversary Volume in honor of Sir William Osler's seventieth birthday, and I was requested to furnish the article, I immediately cast about for a suitable subject. There came to mind a small volume, discovered some years ago in an obscure corner of the library of the Naval Medical School, remarkably advanced in its thought for the times, entitled, "A Treatise containing a Plan for the Internal Organization and Government of Marine Hospitals in the United States together with Observations on Military and Flying Hospitals and a Scheme for Amending and Systematizing the Medical Department of the Navy," by William P. C. Barton, M.D., Surgeon in the Navy of the United States; Second Edition, Philadelphia, 1817. It occurred to me that a biographical study of the author of this volume might prove of historical interest in revealing the state of naval medicine at that early period in our service. There have appeared several excellent biographical sketches of naval medical officers distinguished for bravery in action and heroic self-sacrifice in the line of duty, but, so far as my knowledge goes, no one has essayed to portray a

Reprinted from the *Annals of Medical History*.

[1] The following are noteworthy examples:

(1) Gatewood, J. D.: "The Private Journal of James Markham Ambler, M.D.," Passed Assistant Surgeon, United States Navy, and Medical Officer of the Arctic Exploring steamer *Jeannette*." *Nav. Med. Bull.*, April, 1917.

(2) Id., "William Longshaw, Jr., Assistant Surgeon, U. S. Navy, 1839–1865." A Biographical Sketch. *Nav. Med. Bull.*, October, 1913.

(3) Elder, William: "Biography of Elisha Kent Kane." Childs and Petersen, Philadelphia, 1858.

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(1.

Sick Reports of the Frigate United States,
Stephen Decatur Esqr. Commander.
William P. C. Barton, Surgeon.
{Cape Verde Island
{Elizabethtown, Va.

Names of the Men.	Diseases
Cornelius Aston	Inflammation of the testes
Wm Wattson	Ulcer on leg (nearly well)
John Easton	Fever (convalescent)
William J. Smith	Rheumatic pains.
John Collins	Ulcer on leg
Wm de Hoole	Dysentery (chronic)
Wm Ryselow	Typhus fever
Mr Riley	Inflamed arm
Robert Russel	Cough and ulcer on leg
Wm Reid	Piles
John Hill	Swelled hand
Frances Charles	Sore knee
John Goff	Contused toes
Wm Beach	Venereal
John Veale	
John Shepherd	
Thom Harper	Sick
Levy Haines	
John Reed	
James Flinn.	

Admitted on the sick list this morning 3, viz
James Dunity, with ulcer, George Abbott, incised wound
of the foot, and John Fenton, with fistulous ulcers in rectum

(continued next page.)

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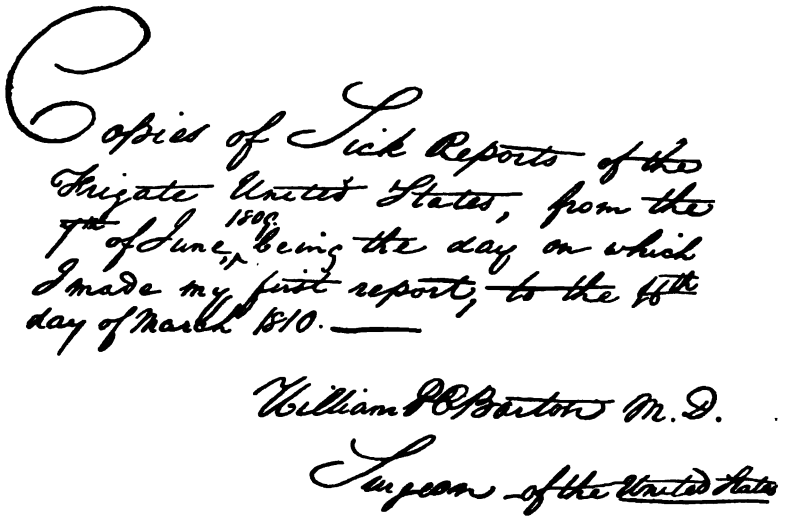
Copies of Sick Reports of the
Frigate United States, from the
7th of June, 1809, being the day on which
I made my first report, to the 18th
day of March 1810.
William P. C. Barton M. D.
Surgeon of the United States

Sick Reports of the Frigate United States.

character like that of Dr. Barton, less heroic perhaps, but one whose influence in the direction of medical reform and sanitary improvement in the early Navy was unquestioned. His book first appeared in 1814, and the mere fact of its having achieved a second edition three years later is an indication of the estimation in which it was held. It contained a fund of information collected from various sources, both at home and abroad, and revealed an originality of thought and an independence of expression which stamped its author as far in advance of the times. A similar work by Dr. Edward Cutbush of the Navy had appeared in 1808, but this dealt with subjects in army administration as well as naval, and lacked the breadth and originality of view characteristic of Barton's book.

In the following biographical sketch I have endeavored to present the outstanding facts of Dr. Barton's career in the Navy, and particularly to reveal his work as a pioneer in the field of American naval medicine.

William Paul Crillon Barton was born in Philadelphia, November 17, 1786. He was the son of William Barton, Esq., Member of the Bar, and grandson of the Rev. Thomas Barton, an Episcopal clergyman, who came to America from Ireland in 1751, under the patronage of the Penn family. The Barton family was of English descent, originally from Lancashire, but having obtained extensive grants of land in Ireland, settled there during the Commonwealth or early in the reign of Charles II. The emigration of Thomas Barton took place when he was twenty-one, soon after his graduation from Trinity College, Dublin. He first opened a

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school at Norristown, but later became a tutor at the Philadelphia Academy. In 1753 he married Esther Rittenhouse, the daughter of a neighboring farmer and a sister of David Rittenhouse, the distinguished mathematician and astronomer, whose close friendship Barton enjoyed until his death. He accompanied the expedition against Fort Du Quesne in 1758 in the capacity of chaplain and published a sermon dealing with the disastrous incidents of that affair. In 1759 he moved from York County to Lancaster, where, as rector of St. James, he remained for nearly twenty years, dividing his time between the duties of his office and the pursuit of natural history. Notwithstanding his friendship with Washington and other distinguished officers of the Revolution, he remained a Royalist and, declining to take the oath of allegiance to the new cause, was compelled to leave his post, going to New York. From that city he intended to proceed to England, but illness prevented and he died there on May 25, 1780. His widow returned to Philadelphia, making her home with her nephew, Dr. Samuel Bard, at one time physician to Washington.

William Barton, the eldest of Thomas Barton's eight children, and the father of William P. C. Barton, was a lawyer by profession, a gentleman of substantial literary attainments, the author of the "Memoirs of Dr. David Rittenhouse," and the designer of the United States Seal. He married Elizabeth, the daughter of John Rhea, a Philadelphia merchant and of their marriage several children were born, two of whom became distinguished surgeons, one the subject of this paper and the other John Rhea Barton, whose name is perpetuated as the originator of "Barton's bandage."

Another distinguished son was Dr. Benjamin Smith Barton, Professor of Botany at the University of Pennsylvania, and also, in later years, the successor to Dr. Benjamin Rush as Professor of the Theory and Practice of Medicine in the university.

Thomas Pennant Barton, a son of Benjamin Smith Barton, was also a man of cultivated literary tastes and achievements. It is noteworthy that he gathered together one of the best collections of Shakespeareana in America. These, together with some 10,000 miscellaneous books of his library, were acquired after his death by the Boston Public Library, where they are known as the Barton Collection.

From the foregoing it will be seen that the subject of this sketch came of a family of students, and as a contemporaneous writer has stated: "His forebears were eminently qualified to infuse into his mind the rudiments of knowledge and the principles of virtue."

Dr. Wm. P. C. Barton received his classical education at Princeton, graduating with distinction in 1805. Each member of his class assumed

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the name of some celebrated character, and Barton chose that of Count Paul Crillon, whose initials he retained throughout life. He began a study of medicine under the direction of his uncle, Dr. Benjamin Smith Barton, and received his degree in 1808. His inaugural thesis was entitled, "A Dissertation on the Chymical Properties and Exhilarating Effects of Nitrous Oxide Gas and its Application to Pneumatick Medicine." This was considered worthy of publication and for many years was accepted as a standard treatise on the subject. Soon after graduation he made a translation from the Latin of Jacobus Gregory's "Dissertation on the Influence of a Change of Climate in Curing Diseases."

After practicing medicine in Philadelphia for about a year, during which time he became one of the surgeons to the Pennsylvania Hospital, he received an appointment as surgeon in the Navy, upon the recommendation of Dr. Benjamin Rush and Dr. Philip Syng Physick. He was for several years on active duty in the frigate *United States;* the *Essex;* at the Navy Yard, Philadelphia; as surgeon to the Marines at Philadelphia; at the Naval Hospital, Philadelphia; on the *Brandywine;* the Naval Hospital, Norfolk; the Naval Asylum, Philadelphia; as Chief of Bureau of Medicine and Surgery; at the Naval Hospital, Pensacola, and as president of the Board of Medical Examiners at Philadelphia. He distinguished himself by his professional skill and his scholarly attainments, and particularly by his bold and fearless advocacy of necessary reforms in the medical department of the Navy and the improvement of the status of the naval surgeon. During his periods of shore duty he was not content to pass his time unemployed, but devoted himself with marked professional ardor to the publication of various works, some growing out of his naval experience, like that on "Marine Hospitals" mentioned above, and one entitled "Hints for Naval Officers Cruising in the West Indies," written in 1830, and others mainly on botany. In 1815 he was chosen Professor of Botany in the University of Pennsylvania, succeeding his uncle, and in later years he was connected with Jefferson Medical College in a similar capacity. He was also a Fellow of the College of Physicians, a member of the American Philosophical Society, President of the Linnæan Society, an Honorary Member and Surgeon of the First City Troop, and upon the creation of the Bureau of Medicine and Surgery in the Navy Department, Dr. Barton was tendered and accepted the appointment of chief of this bureau. He was, therefore, the first Chief of Bureau, though not the first Surgeon General of the Navy. This title was not created until 1869 and was first held by William Maxwell Wood. In fact Barton was much opposed to the adoption of the title Surgeon General, and in 1838, when legislation designed to create it was pending before Congress, he addressed a pam-

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phlet to the members of the Committees on Naval Affairs of the Senate and the House of Representatives, entitled, "A Polemical Remonstrance against the Project of Creating the New Office of Surgeon General in the Navy of the United States." This publication reveals that he was also a corresponding member of the Imperial and Royal Academy of Agriculture of Florence; a member of the Linnæan Society of Stockholm and a lecturer on materia medica, botany, toxicology and naval therapeutics in the Therapeutic Institute of Philadelphia.

While Chief of Bureau he introduced many reforms, corrected numerous abuses and received for his services the warm recommendation and approval of the then Secretary of the Navy, the Honorable Abel P. Upshur. His attempts to improve conditions in the Medical Department, however, met with opposition and rendered him very unpopular with those whose interests or hopes were endangered by his efforts. He was not deterred, however, and in spite of resistance accomplished much in the direction of improvement of conditions in the Navy, both medical and non-medical in character. On March 20, 1844, after holding this office for eighteen months, he addressed a letter of resignation to the President praying for approval of his "earnest wish . . . to retire from the scene of unavailing efforts." He retained his naval commission, however, doing duty at Pensacola Hospital, but chiefly on the Medical Examining Board at Philadelphia, and at the time of his death in 1856 he had been for many years the senior surgeon in the Navy.

In September, 1814, Dr. Barton married Esther, daughter of Jonathan Dickinson Sergeant, Esq. (a member of the Philadelphia Bar), and a granddaughter of Dr. David Rittenhouse.

Of his character, appearance, and personal attributes, I have been fortunate in securing a reflection from several sources. The portrait which forms the frontispiece of this article was taken from what appears to be an enlarged photograph now hanging in the office of the Surgeon General of the Navy. This came from the Naval Medical School some years ago, but I have not been able to determine anything of its prior history. It is said by one of his descendants to whom the reproduction was shown to be a good likeness and represents his peculiar manner of dress, which even for the times was considered somewhat elaborate and eccentric. It is supposed to represent him as he looked about the time he was appointed Chief of Bureau. In a speech delivered in the House of Representatives, early in 1844, by the Hon. Alexander H. H. Stuart of Virginia, Barton was referred to, in connection with an investigation into the expenditures of the newly created Bureau of Medicine and Surgery, in terms which give us an idea of the impression made upon a contemporary by his manner and style of composition. Mr. Stuart stated:

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I, like others, have been somewhat prejudiced by the artificial and involved style of his report submitted to the House; a prejudice by no means diminished by his manner and style of dress, equally unnatural and eccentric. But when I knew him better and heard and saw the improvements which he had introduced into the bureau, my prejudice vanished and I became satisfied he was a most capable and faithful officer.

The same speaker refers later to his "bold and manly spirit of independence, which induces him to shrink from no responsibility."

In the findings of his court-martial in 1818, a reference is made by the court to "the vehemence of his manner (which) imparted impressions his language and intentions would not warrant."

One of the most valuable comments on his manner and personal qualities appears in an address delivered before the Alumni Association of the Jefferson Medical College, on March 11, 1871, by Dr. Samuel D Gross, Professor of Surgery in the College and President of the Association. He refers to Dr. Barton in these terms:

The instruction in *Materia Medica*, during the two winters of my connection with the College, was delivered by Dr. William P. C. Barton, brother of Dr. John Rhea Barton, the eminent surgeon, and a nephew of Dr. Benjamin Smith Barton, formerly a professor in the University of Pennsylvania. He was, in all respects, a remarkable man: highly educated, learned in his profession, a graceful lecturer, and able writer and one of the most accomplished botanists in America. He abounded in flashes of wit, and a vein of irony and sarcasm was perceptible in almost everything he did and said. He had a passionate love of music and played with consummate ability upon the flute and violin. Many of his acts were marked by the eccentricities of genius. His style of lecturing was conversational, plain, simple and didactic, without any attempt at oratory, and his success as a teacher was all that could have been desired. In his appearance he was a model of neatness and elegance. He seldom wore the same coat, vest, or cravat on two successive days. In his criticisms of contemporaneous writers he was often severe and even bitter, especially when he had occasion to speak of a certain writer on *Materia Medica*, with whom he had long been on terms of open hostility. He would then, often with a peculiarly disdainful curl of the upper lip, fly off into the keenest satire and invective, much to the amusement of his young auditors, all of whom, with few exceptions, were warmly attached to him. It was his invariable practice, too much neglected in most of our schools, every morning to ask the class some questions respecting the lecture of the previous day.

. . . . . .

During my first summer in Philadelphia I was a member of Dr. Barton's botanical class, and usually attended him in his botanical excursions along the banks of the Schuylkill, visiting Bartram's Conservatories or rambling about in the open field in search of specimens. In these excursions he was always in his happiest mood, skipping merrily, like a humming-bird, from flower to flower. He experienced as great delight in the discovery of a new plant as Audubon did at the sight of an undescribed bird, or John Hunter, in the dissection of a strange animal. He was in fact a botanical enthusiast.

In attempting to find Dr. Barton's grave in Laurel Hill Cemetery,

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Philadelphia, I was fortunate in getting in touch with one of his lineal descendants. This gentleman I met later and obtained from him much additional information, of a character which could not have been secured elsewhere.

Through his kindness I have been able to read a "Biographical Sketch" of Dr. Barton which was compiled in 1879 by one of Dr. Barton's daughters. In this she refers to her father as possessing "many personal attractions and accomplishments. He retained, even to advanced years, a great love for music and great conversational powers. His character was a happy combination of qualities which attracted all and repelled none. Of great courage without any bravado, of affability without servility, of true warm-hearted benevolence, his qualities of heart and of mind were well calculated to secure lasting friends among the good and true."

I also learned from him that Barton had assembled in his lifetime a very remarkable collection of musical instruments, which he recalls seeing as a child in the home on Chestnut Street. It was here that Barton lived and had his office. The house is still standing, but in reconstruction it has been joined to another, which has been built over part of the plot, formerly the garden of the Barton home.

The facts recorded regarding Dr. Barton's career in the service were found to be few and meager, particularly with reference to his service at sea, and the chief and most valuable sources of information regarding him were found in "Officers' Letters," scattered throughout many volumes, covering the years 1809 to 1848, which are filed in the Navy Department Library. These, together with allusions made in his writings to various incidents of his life and work, have constituted the main sources from which the facts of this sketch have been drawn.

The records of the Navy Department show that Dr. Barton was appointed a surgeon on April 10, 1809, to take rank from June 28. His letter of appointment also contained orders to the frigate *United States*. In a letter written from the Pennsylvania Hospital, and addressed to the Honorable Charles M. Goldsborough, Esq., Secretary of the Navy, he accepted his appointment and requested a delay of six weeks before joining the *United States* explaining that the delay was necessary to enable him to complete his term of service at the hospital, which ran to July. It is apparent from this letter that he felt a deep sense of obligation to fulfil what he considered an implied contract with the hospital authorities to remain until his period of service was completed, but his request was denied, for the "Sick Reports" of the *United States* show that he was already aboard that vessel on June 7, 1809. On June 10, 1809, Stephen Decatur, Jr., had joined the *United States* and hoisted his broad

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pennant as commodore for the first time, and then began the friendship with Decatur which lasted throughout life. Very little has been found respecting Barton's service on this vessel, which apparently continued only until about November 10, 1810, for soon after that date he is found on the *Essex*.

Practically no medical records relating to the ships of this period are to be found in the Navy Department, but, by a mere chance, two thin volumes of the "Sick Reports" of the *United States*, in Barton's own hand-writing were found in the Library of the Naval Medical School, where they had been placed in 1905 by former Surgeon General Rixey, who had discovered them in a secondhand bookstore in New York.

In the early days of the Navy, although the regulations required the commander of a vessel to keep an official log, the Government did not furnish the log book. It happened, therefore, that a book purchased by an officer for this purpose was often regarded as personal property and taken away by him when detached from the ship. It is not improbable that a similar custom existed with respect to medical records. This condition of affairs may account for the absence of medical records covering this period and also for the fortuitous discovery at this late day of the "Sick Reports" of the *United States*. These reports ran from June 7, 1809, to November 10, 1810, and were entered in Barton's hand-writing in two small notebooks. A reproduction of the first two pages, showing the opening entries, appears in the text of this article. As one scans the pages of these small books it is surprising to note how sparse is the information to be obtained regarding the movement of disease or important daily events. Only one entry is made giving the location of the ship, that occurring on the second page, where it is noted as "Crany Island, Elizabeth River, Vir." Unfortunately, no record of the other ports or places visited is found. The usual day's record shows the name of the disease, complaint or injury, rarely in a scientific nomenclature, which is set opposite the name of the patient, and an entry is made of admissions and discharges for the day. The progress of a patient is sometimes stated in a word or two, such as "improving," "better," or "worse," too often the latter, and deaths are not infrequent. The prevalence of "typhus fever" is noteworthy and by this, of course, is meant the typhoid fever of later days, although the occasional sudden demise of a patient with "typhus fever" suggests *typhus exanthematicus*. In those days, as now, itch and venereal diseases occupied a conspicuous position in the sick returns, and the occasional appearance of midshipmen with the latter class of disease, with the added remarks, "reported to the commodore as rheumatism," denoted a kindly intention on the part of the surgeon to shield them from the stigma attaching to these affections.

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On July 15, 1810, for the first time, Dr. Barton makes extended "Remarks," at the end of the day's record, as follows: "The dysentery and diarrhea are now and have been for the last ten days the prevailing diseases on board the ship. Most of the patients on the sick list with other diseases are more or less afflicted with these complaints in a slight degree. Neither of these diseases, however, are of a very violent nature." This constitutes the only clinical observation of any moment which I could discover in a review of the seventeen months' record contained in these reports. It is also quite remarkable how seldom mention is made of the transfer of patients to hospital. However, considering the character of the so-called hospitals then available, it is perhaps not surprising that he preferred to retain the sick aboard ship. Later in his career he urged improvement of naval hospitals with characteristic vigor, and a critical reference in his book on "Marine Hospitals," published in 1814, with respect to the hospital at the Navy Yard, Philadelphia, was the basis of charges, made by a brother medical officer, which resulted in the court-martial of Barton. The court, however, perhaps realizing the justice of his criticism, ruled that the specification covering the alleged offense need not be answered or refuted, and thus virtually exonerated Barton of this specification of the charge. Some of the entries in the "Sick Reports" are very obscure in their clinical and pathological significance. For instance, while there can be little question regarding the nature of the disease entered as "typhus," which caused the death of Wm. Rysela on July 6, 1809, since Barton has added "sick two months," what did James Williams 1st really succumb to on August 17, 1809, under the designation "nervous fever," when on the previous day he first appears as "very ill, typhus?"

Barton mentions in his work on "Hospitals" that he checked several cases of sea-scurvy on the *United States* by the liberal administration of lime juice. He had much to say later, after his cruise abroad in the *Essex*, of its virtues as an anti-scorbutic, and urged its adoption by our Navy, in an official report.

In the Preface to the first edition of his work on "Marine Hospitals," Dr. Barton refers to his attempts to bring about correction of the abuses and irregularities then prevailing in the Medical Department, by reason of what he terms "loose administration." As his statement there fully reflects his attitude toward the problems confronting him on the frigate *United States*, and his grave concern for the welfare of the sick, and the improvement of medical supplies, I cannot do better than quote it at length:

> Having entered the Navy as a surgeon when very young, and having been ordered to one of the largest ships in it, with a complement of 430 men, stationed in a warm

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and variable climate—I soon found myself not a little embarrassed by the perplexities that I daily met with in my practice on board. The unhealthiness of the climate, operating upon a variety of different constitutions in an entirely new crew; the change of diet and mode of life; the necessary and unavoidable exposure of boats' crews to the fervid rays of a vertical sun, as well as to the damp and heavy dews of night, and at all times to the insalubrious exhalations of marsh miasma—all combined to generate such perpetual sickness, that the frigate might almost have been called a hospital ship—the average number on the daily sick-list, of fevers and fluxes, being about 40. In this situation, on board of a ship just refitted, commissioned, and equipped, I found myself without half the comforts and necessaries for the sick that the hospital department should have been supplied with; yet this department had been reported as replenished with every requisite article for a cruise of two years, and together with the medicine chest, had cost the government fifteen hundred dollars. There were neither beds for the sick, sheets, pillows, pillow-cases, nor nightcaps—nor was there a sufficiency of wine, brandy, chocolate, or sugar; and that portion which the storeroom contained of these articles was neither pure nor fit for sick men. The medicine chest was overloaded with the useful, and choked up with many useless and damaged articles. Such was the state of the medical department of this ship! Upon a representation of it however to her commander, Com. Decatur, he generously allowed me all the necessaries I stood in need of, and thus enabled me to administer those comforts to my patients, which they so much required. What would have been my situation, had the ship immediately proceeded to sea, for a cruise of eight or ten months, upon my joining her, and before I had an opportunity of examining into the condition of the medicine and store chests . . . which might have been the case, these having been reported as sufficiently furnished? What the consequence would have been must be obvious! The other ships were not better furnished than the one of which I am speaking—and I perpetually heard of complaints on this score.

What was the cause of these abuses? The want of a regular board of medical commissioners, whose peculiar province it should be, to order the proper proportions and quantities of medicine, comforts, and necessaries, for the publick ships, and who should have no interest, directly or indirectly, individually or collectively—in the furnishing of articles thus ordered.

As I was at that time a perfect novice in the routine of ship duty, and having then but recently left the Pennsylvania Hospital, an institution in which order, system, and punctuality, render the practice of medicine a pleasure, I was overwhelmed with the difficulties I had to encounter in the performance of professional duties, where every species of inconvenience and disadvantage that can be imagined was opposed to the exertions of the surgeon. My feelings revolted from the idea of continuing in such a perplexing and distresisng situation—and I became disgusted with the unavailing toil attendant upon ship-practice. I communicated my sentiments on this subject unreservedly to my lamented friend, the late Captain Wm. Henry Allen, then first lieutenant of the ship. I ventured, even at that early period of my naval service, to condemn the flagrant irregularities and abuses, that I could not but believe existed to a ruinous extent. In my conversations with him I often declared, that if such was always the deplorable condition of sick men on shipboard, I wished not longer to be their medical attendant; for my feelings were every moment in the day subjected to harassment and pain, from contemplating afflictions I was unable to relieve, for the mere want of comforts so easily procured on shore. He encouraged me, however, to persevere, and at the same time that he lamented with me the want of a superintending medical board, he tendered an offer of his assistance in making any

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arrangements compatible with the internal economy of the ship, that I might deem calculated to meliorate the condition of the sick. I soon found that their situation was susceptible of much relief, even on ship-board—and I was not long concluding, that if proper steps were taken to furnish the ships with sick-necessaries of a proper kind, the practice of medicine and surgery in the navy could be rendered not only more beneficial to the sick, but less offensive to the humane feelings of the medical officer. I never lost sight of the opinion I had conceived, that the errors of the medical department of the navy might be easily corrected, and its abuses abolished."

Surgeon Barton's relations with Commodore Decatur and with the first lieutenant of the *United States*, William Henry Allen,[3] appeared to have been most cordial and harmonious. This is evidenced by the fact that Decatur, in 1813, applied to the Secretary of the Navy for Barton to be returned to the *United States*, and in 1817 he gave him a strong letter of recommendation to the then Secretary of the Navy, and both he and Captain David Porter of the *Essex* came to his aid in support of many of the reforms he had projected. Decatur in the letter of recommendation above-mentioned testified "to the great skill and attention and success with which he (Barton) practised during the above period" (1809–1810). Late in 1810, however, Barton appears to have had some disagreement with certain officers on the *United States*, the nature of which is not revealed, but the resulting situation made it expedient for him to leave the ship. About this time the *Essex* was preparing to sail for Europe, and since her surgeon, Dr. Stark, was on leave at some distant point inland and could not return in time to reach the ship before sailing, with Decatur's approval, and as a convenience to Captain Smith of the *Essex*, Barton left the *United States* and joined the *Essex*. It was during this cruise that he gathered much of the information regarding naval hospitals, and naval medical practice abroad, both in the navies of Great Britain and France, which appeared later in his writings. His observations covered a wide range of subjects, including the construction and arrangement of all the principal naval hospitals of England and France, their organization and administration; sanitary matters touching the naval services; methods of training medical officers; rations; character of supplies furnished ships, their construction, etc. He appears to have visited London from Cowes, Isle of Wight, where the ship was lying, and, while there, to have met the celebrated Dr. Lettsom, through an introduction from Dr. Rush, and to have inspected several hospitals. He mentions the homeward bound voyage of the *Essex*, which lasted two months, and speaks of the efficacy of an effervescing mixture of lime juice and salt of tartar for sea-sickness. This he admin-

[3] This is the same Captain Allen who commanded the *Argus* in her encounter with the British brig *Pelican*, August 14, 1813. The *Argus* had sunk 22 vessels off the British coast, but was defeated and captured by the *Pelican*. Allen died of his wounds at Mill-Prison Hospital, Plymouth, England.

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istered to two passengers on board with great success. Other than the above, surprisingly few details of this period of his career were to be found in available material.

On June 30, 1811, he addressed a letter to the Hon. Paul Hamilton, Secretary of the Navy, requesting relief from sea duty and assignment to the Navy Yard, Philadelphia. He mentioned that he had been on sea service without any intermission since April, 1809, and had just returned on the *Essex*. He asserted his willingness to act in concert with, or subordination to, Dr. Cutbush, the surgeon in charge at Philadelphia, and, although a surgeon himself, was agreeable to service in a position which ordinarily would be assigned to a surgeon's mate. His extreme anxiety to return to Philadelphia apparently arose from a desire to establish himself in practice there, "the accomplishment of which is his dearest wish," to supplement his income, and help support his aged father and seven brothers and sisters. This he desired to do, moreover, while his uncle (Benjamin Smith Barton), who was in a precarious state of health, was still able to take him by the hand and introduce him into practice. He refers to his uncle as a man "the tenure of whose existence is fragile indeed . . . thus there is the brightest prospect of my professional success subject to the constant shadow of a very near cloud." His family is constantly in mind, and, as the eldest son, his concern for their welfare is often reflected in his letters. The pay of a surgeon at this time, including the value of two rations, was $62 per month, a sum wholly inadequate to the value of the service performed, and, of course, not sufficient to enable him to contribute materially to the support of his family. He speaks further of the difficulty aboard ship of keeping himself abreast the times professionally. "The unsettled and wandering life on board ship not only deters the gratification of professional ambition, but absolutely generates an inanition of mind very inimical to solid improvement of any kind. The sea does not subject me to any corporeal malady but really produces a spiritless inaction and mental debility which all the resolution I have been able to exert for better than two years has not afforded me the power to overcome." His appeal however, appears to have fallen on deaf ears, for he was not detached from the *Essex*, but did manage to get leave until September 1. A letter dated July 11, 1811, written from Baltimore, addressed to the Secretary of the Navy, refers to a bottle of lime juice which he is sending him by Lieutenant Ballard for trial "in the form of a lemonade, after allowing it to settle for a day or two." This is one of four dozen bottles which Barton brought back from England, and he explains that his object in sending the lime juice is to enable the Secretary to judge of the quality of juice used in the Royal Navy, which is the kind he wishes to recom-

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mend for our own. He also mentions his intention to submit a report on this subject. This letter indicates that he had been in Washington and was on his way to Lancaster, but had been delayed in Baltimore on account of an attack of "summer complaint." On August 26, 1811, writing from Lancaster, he requests two months' extension of leave, and to be assigned to duty at the Navy Yard, Philadelphia. In this letter he makes the first reference to his intention of writing at length upon his observations abroad and upon a plan for the better government of the Medical Department of the Navy, and puts this intention forth as a reason for the change of duty requested. He also states his desire to take courses of study in the Pennsylvania Hospital. A reference is made in this letter to Mr. Latrobe,[4] whom he has asked to see the Secretary and support his request. But it is all to no avail, for a peremptory order from the Secretary, dated August 29, is sent to him to return as soon as possible to his ship, the *Essex*, at Norfolk. Barton answered this letter from Lancaster on September 4, and voiced his disappointment at not being accorded the leisure to complete his report, but states his intention of doing so at Norfolk. This letter reveals grave discontent at being continued on duty in the *Essex*, a vessel "smaller than the one he first joined when he entered the service," where "his services gave the greatest satisfaction to Commodore Decatur and the officers generally." As respects the latter, with some of whom he had been in disagreement, he states that there has been a reconciliation and he desires his transfer from the smallest frigate in the Navy back to the *United States*. He endeavors to reinforce his argument by adding that "the present surgeon of the *United States* was a surgeon of a cutter at the time I was in the station he now occupies." It is not unlikely that he received still another order from the Secretary to expedite his return to the *Essex*, for Barton wrote from Philadelphia, September 18, 1811, explaining the delay in his journey to Norfolk, as being due to a continuance of the affection which overtook him at Baltimore two months previously, and that he has written Captain Porter of the *Essex* to that effect. He encloses a physician's certificate in support of his statement.

A letter written October 25, 1811, from Norfolk, transmits to the Hon. Paul Hamilton, Secretary of the Navy, a number of sheets containing a plan for the internal arrangement of marine hospitals. This evidently is a further development of his proposed report, which finally grew into the book he published in 1814. The term "marine" hospital as used frequently by him was equivalent to the naval hospital of the pres-

[4] Benjamin Henry Latrobe, 1764–1820. An English architect who settled in this country in 1796. He became identified with the Navy Department as an engineer, and designed the first Hall of Representatives at Washington.

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ent day. At that early period a distinction such as prevails at present did not exist. There were, it is true, "Marine" hospitals for merchant seamen, available to the Navy, which became separated from the Navy by the Act of February 26, 1811.

On November 2, 1811, Dr. Barton is back in Philadelphia, on leave, in order to attend the funeral of a brother. He appears to have traveled by water from Norfolk to New York, on this occasion, in the U. S. S. *Hornet*, then under command of Capt. James Lawrence, thence by stage to Philadelphia, leaving Norfolk October 26 and arriving in Philadelphia November 2, which for the times was quite rapid traveling. In the preface to his 1814 publication he refers to the trip on the *Hornet* and to his visit to Washington in July, 1811, when Mr. Hamilton called upon him to submit his ideas respecting the proper rules for administration of the service hospitals, which the Secretary was required to submit to Congress at its next session. The Act of February 26, 1811, had separated the Navy from the conjoint control of marine hospitals for merchant seamen and had authorized the establishment of distinct institutions for the Navy, but nothing was done until 1832 toward furnishing these hospitals, except to rent temporary structures near the principal navy yards. From that date naval hospitals slowly arose at the principal stations. It was this report containing suggestions for the internal organization and government of hospitals, requested by the Secretary, which Barton refers to in the preface of his book, as having been written "during a tempestuous passage from Norfolk to New York, in the *Hornet* sloop of war, with the ever to be lamented Captain Lawrence, under the disadvantages, too, of sea-sickness and acute mental affliction from the recent loss of a friend—a brother."

On November 18, 1811, Barton writes from Lancaster, where he had gone after his brother's funeral, renewing his request to be ordered back to the *United States*, stating that his action had the approval of Commodore Decatur, and quoting from a letter received from Mr. Allen, first lieutenant, in substantiation of their desire to have him. This letter, which is addressed to the Secretary, also mentions the intention of the writer to leave Lancaster for Philadelphia on November 19, on his way to Norfolk. His failure to return promptly to his post of duty called forth peremptory orders from the Secretary, dated November 23, and Barton replied from Philadelphia on November 27, in effect, that he considers the Secretary's reprimand for not obeying orders as entirely unmerited, and he enters into a long explanation of the circumstances surrounding his transfer from the *United States* to the *Essex* in November, 1810. His delay at Philadelphia he states is due to information received from Norfolk that the *Essex* is coming up the Delaware, and that

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he has remained there to await her arrival. There is a feeling of resentment plainly apparent in this letter to the Secretary which may have had its origin in the knowledge on the part of Barton that the Secretary recently had written Dr. Benjamin Smith Barton, his uncle, and referred to Barton as "too much indulged."

Still on the *Essex*, then at Newport, Rhode Island, on December 26, 1811, Barton writes to Mr. Latrobe, who has agreed to intercede with the Secretary on his behalf in the matter of receiving a twelve months' furlough. He repeats his desire to enter into practice at Philadelphia, but adduces another reason for the furlough, which has not hitherto come to light, although it may have been a powerful influence, in addition to others, in urging him to the repeated efforts he has made to secure the desired duty. This reason, "very dear to my heart," has to do with his engagement to Miss Sergeant, whom he mentions is a granddaughter of Dr. David Rittenhouse, and he asks Mr. Latrobe if she is not a connection of his. Barton encloses in this letter a communication from Captain Porter approving his request, which he asks Mr. Latrobe to present to the Secretary when he makes the plea on his behalf.

A letter of same date goes forward from Barton to the Secretary requesting the furlough of twelve months "in order to get married and also to assist in the support and education of his youngest brother." He suggests a Dr. Miller as his relief on the *Essex*. But his efforts prove fruitless, for Captain Porter receives a letter from Mr. Hamilton which amounts to a denial of Barton's request. On January 18, 1812, he renews his application but reduces the length of the furlough acceptable to him, from twelve months to four or five months. On the 21st of January, not having had any reply to his previous letters, he writes he will take any length of furlough which will be agreeable to the Secretary. On January 22 he addresses the Secretary again requesting the return of the hopital plans forwarded October 25, 1811, and refers to additional work which he is doing in connection with them. On January 24, he informs the Secretary that his father has requested him to resign, but states his unwillingness to do so, on account of a promise made to his uncle not to leave the service until after he has completed his book on Marine Hospitals and the Medical Department of the Navy. On February 13, 1812, not having had any reply to his letters of the 18th, 21st, and 24th of January, addressed to the Secretary, he sends him duplicates and also encloses a copy of Captain Porter's letter. As a possible relief for him on the *Essex* he suggests Dr. Daniel Hatfield of the *Nautilus*. The next letter is dated March 8, 1812, and in this he reports himself as ill in sick quarters at Newport, Rhode Island, with an "affection of the heart," and desires that a surgeon's mate be sent to the *Essex* as a substitute dur-

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ing his illness, and to relieve the surgeon of the *President* of the necessity of looking out for the sick on the *Essex*, which he has done for two months. On March 20, 1812, Captain David Porter of the *Essex* wrote him the following letter:

It is with much pleasure I acknowledge the receipt of your highly gratifying letter of this date and it is the source of the most pleasing sensation to receive the testimony of the approbation of one whom my duty and inclination both prompt me to esteem for his strict attention to his profession and for his character as a gentleman. I cannot but regret the unpleasant circumstance that now renders your absence from duty necessary and offer you my best wishes for the speedy restoration of your health and assurances of the extreme pleasure it would afford me to have you again attached to my command.

On March 21, Commodore John Rodgers, on the *President*, granted Barton a furlough of five weeks for the benefit of his health, on the expiration of which he was desired to return to the vessel to which he was then attached. On April 3, 1812, Barton was ordered to the Navy Yard, Philadelphia, as assistant to Dr. Cutbush, and the next letter from him to the Secretary is dated at Washington April 4, 1812. In this letter he refers to certain "Rules and Regulations for the Government of Naval Hospitals," which apparently the Secretary had submitted to Barton for criticism. He addresses his reply through Mr. Goldsborough and expresses his unqualified approval of the "Rules." His duty at Philadelphia was not long undisturbed, for on June 22, 1812, he was ordered to the brig *Argus*, with an intimation that after a short cruise he might expect to return to Philadelphia. His reply by letter dated June 24, 1812, complaining of his treatment since being in the service and protesting against being assigned to a brig after service in a frigate, apparently had the desired effect, for there is no evidence that he went to the *Argus*; on the contrary, several letters from Dr. Cutbush to the department during the succeeding months make references to Barton in connection with duties at the Navy Yard, or vicinity. His official record, however, shows that on February 20, 1813, he was ordered to the *United States*, but these orders were revoked for reasons which appear later.

On January 1, 1813, Lieut. John B. Nicholson, who was with Decatur on the *United States*, then at New York, had written to Barton as follows:

The Commodore is in want of a *Surgeon* and has requested me to write you on the subject, and if you will go again in this ship *in that situation*, you will be *so good* as to write me *immediately*, and he will then apply for you to the department. Although so long silent, believe me, I have often thought of the many pleasant moments passed in your society, and I as well as my mess will be happy to call you by the endearing name of mess-mate and friend. To Spencer Sergeant will you give my respects, and believe me to be your friend.

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What answer Dr. Barton made to this letter is not known, but subsequent correspondence from Decatur to him makes it plain that he declined the appointment. On March 11, 1813, Commodore Decatur wrote him as follows:

Enclosed is a letter which I have received from the Navy Department with instructions to forward it to you. I apprised the Secretary of the reasons which you had urged to me, to induce the recall of the order you were under for my ship. I stated to the Secretary, that if they struck his mind with the force they had mine, you would be gratified in your wishes, and some other gentleman substituted. Will you have the goodness to let me know your determination on the subject as soon as possible. Your friend and humble servant, Stephen Decatur.

The enclosure referred to in this letter was in all probability the Secretary's order, which reads as follows:

Com. Decatur wants a Surgeon, and from his confidence in your abilities, he has asked that you might be ordered to his ship. Anxious as I am to give him a Surgeon acceptable to him, I have to direct that you will proceed to New York and place yourself under his command. W. Jones.

I have given this correspondence at some length, since Barton's declination of sea duty in time of war subjected him to severe criticism, openly expressed in later years, when he was Chief of Bureau, by his enemies, of whom he appeared always to have a liberal number, who were active at the time in attempting to legislate him out of office. In 1843 a Proviso was attached to the Naval Appropriation Bill which provided that any appointee as Chief of Bureau, in order to be eligible, should have completed at least five years' service at sea. The effect of this, if passed, would have been to vacate the offices of two Chiefs of Bureau, of which Barton held one. In defense of his position and in answer to the criticism that he had refused service in time of war, Barton addressed a letter to the Hon. George Evans of the Senate in which he referred to his declination to go to the *United States* in the following terms:

The only order he received during the war was one to Commodore Decatur's ship. That officer was the embodiment of honor and heroism, and *that officer obtained a revocation of that very order*, under a full knowledge of all the circumstances of the then employment of the undersigned in Army duty, as well as Naval duty; and with a knowledge too of the state of his health, then improving but not reinstated. . . . If such a man as Decatur saw no wrong in the declination of the order to his own ship; if he undeviatingly bestowed his respect on the undersigned, from the first of his acquaintance with him until the day of his death, can any other man in the Navy be justified in an attempt to impugn the reputation of the undersigned on that ground?

The reference to "Army duty" in this letter brings to light the fact that in 1812 and 1813 while on the Philadelphia station he had offered to perform the duties of surgeon to the different recruiting rendezvous of the Army District.

The District Orders of February 1, 1813, read:

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His (*i. e.*, Barton's) certificate is necessary to pass a recruit and no other physician was to be called upon to visit and pass enlisted soldiers, except in circumstances which will not admit of delay.

In his work published in 1814, he refers to this service as follows:

In the first year of the present war I examined 2,000 recruits in the city, and from the neighborhood of Philadelphia. Twelve hundred only of this number did I pass as able-bodied men; and of the rejected number, 800, more than two-thirds were refused on account of rupture.

On May 10, 1813, Dr. Cutbush having secured his own transfer to duty in Washington, Dr. Barton made application to succeed him at Philadelphia. It does not appear that this request was denied, and at any rate he appears to have remained near Philadelphia, carrying on his service duties, Army and Navy, pursuing his practice, and delivering his lectures as professor of botany at the university. In addition he did a prodigious amount of writing and published several books. In a letter to the Secretary dated May 25, 1813, he voices his concern at the insufficient accommodations for the sick at the Navy Yard. He states that the small building appropriated to the reception of sick, calculated to accommodate eight patients, now has twenty-four sick sailors, and suggests the necessity of some temporary arrangement. Commodore Murray declined entering into any measure without instructions from the Secretary, but approved of Barton's writing to represent the matter, and, as a result, the Secretary authorized the erection of a frame building. It was his strictures on the sick quarters at this yard, appearing in his book published the next year, which Dr. Harris objected to as reflecting upon Dr. Cutbush and which led to Barton's court-martial in 1818. It is interesting to note just what Barton said in this connection, and see how far his contemporaries bear him out with respect to the standards of sick accommodations available in the Navy at that time. He states:

I have myself seen among a number of sick seamen with whom I was left in charge at the navy yard of this place (Philadelphia) where they were necessarily huddled into a miserable house, scarce large enough to accommodate the eighth part of their number—a spirit of impatience. . . . So wretched was the hovel and so destitute of every necessary comfort for sick persons, in charge of which I was left with thirty patients . . . that every man who gathered sufficient strength . . . absconded immediately.

On March 17, 1820, Commodore John Rodgers, then president of the Board of Navy Commissioners, addressing the Chairman of Naval Affairs of the Senate, represented the inexpediency of blending navy and marine (merchant) hospitals, and speaking of the temporary hospitals at navy yards, he stated, as follows: "Cheerless and comfortless as they are, they are yet preferable to hospitals provided for seamen of the merchant marine."

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This comment on temporary hospitals, it will be noted, was made some seven years after Barton's statement. A letter from Captain Chauncey, December 24, 1810, then in command of the Navy Yard, New York, to the Secretary of the Navy may be quoted as indicating the character of the sick quarters on that station:

> I conceive it to be my duty to avail myself of this opportunity to call your attention to the situation of the sick on this station, and the particular hardship upon officers who may contract disease in the execution of their official duties, to be obliged to take lodgings at great expense, which frequently subjects them to pecuniary embarrassment, or to be placed in common with the sailors and marines in a large room that is neither wind nor water tight. To give you some faint idea of what is called the hospital on this station, imagine to yourself an old mill, situated upon the margin of a millpond where every high tide flows from twelve to fifteen inches upon the lower floor and there deposits a quantity of mud and sediment, and which has no other covering to protect the sick from the inclemency of the season than a common clap-board outside without any lining or ceiling on the inside. If, Sir, you can figure to yourself such a place, you will have some idea of the situation of the men on this station.

It does not appear, therefore, that Dr. Barton in his statement of fact regarding the sick quarters at Philadelpnia had represented a condition which was peculiar to any one place in the naval establishment of those days, but one more or less characteristic of several. On September 20, 1816, there appears a letter in the files of the Navy Department from Dr. Barton, enclosing one from his father, both of which were addressed to James Monroe, then Secretary of State. These letters solicited a favorable recommendation of Dr. Barton to the notice of the Secretary of the Navy, the Hon. Benj. W. Crowninshield, or to his assistant, Mr. Homans. Whether as a result of this correspondence or not is not certain, but on September 30, 1816, Dr. Barton was ordered to report to Commodore Murray at the Philadelphia Navy Yard for duty, presumably as surgeon to the marines. On November 7, 1817, he attained his real goal, by being ordered to the Naval Hospital, superseding a junior, Dr. Thomas Harris, in that position. This supercession of Dr. Harris created ill feeling on the latter's part and led to the court-martial of Barton in January, 1818, on charges preferred against him by Harris. The circumstances preceding this action were rather complex, but somewhat as follows: In November, 1817, Dr. Barton's father had succumbed to his last illness at Lancaster, and after settling his father's affairs there, Barton had proceeded to Washington, armed with a letter of introduction from Richard Rush, Esq.,[5] to President James Monroe. Barton duly presented his letter, made his call on the President and asked for a more extended interview, which was granted him on the evening of the same day. At this interview Barton pressed his claim for duty at the

[5]Secretary of State under Monroe, later Minister to Great Britain.

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Naval Hospital at Philadelphia. With President Monroe favorably inclined toward him, and armed also with a letter from Decatur to the Secretary, recommending him "for any vacancy that may exist in the line of his profession," he approached Mr. Homans, acting in Mr. Crowninshield's absence, and his orders to the hospital soon followed. In acting in the manner described, Dr. Harris considered that Dr. Barton had treated him unfairly, and he proceeded to bring charges, founded partly on this incident and partly on the statement in his book, derogatory, as he thought, to Dr. Cutbush, which has already been alluded to. While the charges against Barton were pending, he received a note from Commodore Alexander Murray, in command of the Philadelphia station, asking for his resignation, or, as an alternative, an order of arrest. Barton's reply, I think, is worth quoting:

Sir: "I have received your note of the 10th Dec. 1817, by Capt. Brown, in which you say, 'Capt. Brown is empowered by me to offer you the alternative of resigning your commission as surgeon in the Navy of the United States or to hand you your arrest'; and in reply to it I have to say, that conscious of the strictest propriety in my conduct relative to the station of Hospital Surgeon of this place, I have not one minute's hesitation in rejecting the alternative proposed."

The court-martial which was convened at Philadelphia, January 7, 1818, charged Barton with "conduct unbecoming an officer and a gentleman," with two specifications in support of the charge, the first of which related to a statement in Dr. Barton's book on "Marine Hospitals," previously mentioned, criticizing the condition of the hospital at Philadelphia, which Harris claimed tended falsely to degrade the character and reputation of Barton's predecessor there, Dr. Edward Cutbush, who at the time was surgeon in charge. The court ruled that no answer or refutation need be made to this specification of the charge. The second specification of the charge was that Barton had, while surgeon to the Marines at the Navy Yard, Philadelphia, "insidiously solicited and procured Dr. Thomas Harris to be superseded and removed from his place at the hospital, and obtained it for himself." It appears that Barton had "jocosely" remarked to Harris some time prior to the time he was called away to attend his father's funeral, that he (Dr. Harris) had better look to his position at the hospital, as he intended getting it for himself if he could, especially as his seniority entitled him to it. The court decided that the charge was sustained "to a certain extent only" and acquitted Dr. Barton of having uttered a wilful and deliberate falsehood. "The court deemed it derogatory, however, to the honor of the service, . . . this shuffling for particular places, presumed to be given according to seniority or merit and which should ever be left to flow from the spontaneous choice of the guardians of our interests and our

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rights," and sentenced the accused to be reprimanded by the Secretary of the Navy. The court also stated in the letter of reprimand that they "were peculiarly struck with the number and weight of testimonials adduced in relation to your talents, your usefulness, and, heretofore, honorable deportment."

This court-martial was unique in many respects, particularly in that President Monroe was summoned as a witness for the defense. On the back of the summons he stated that official business would prevent his appearance, but he submitted full answers to the interrogatories sent him, and these were favorable to Barton. On his trial Dr. Barton introduced a long forty-eight page letter of defense, which is a remarkable literary production, unfortunately much too long to include here, but I think his final peroration is worthy of presentation:

> I yet firmly believe the reality will sooner or later appear. There is an invincible strength and boldness in truth that rends whatever cloak dishonesty may put over it; and despite of every untoward effort to conceal it from view, it fearlessly shows its face! Well for the innocent that this is so and woe to the one who meddles with and disturbs the calm and consistent operation of honest policy! A short-lived triumph may be his boon, but remorse must soon destroy it, and in the fullest conviction I believe with the poet:
>
> There surely is some guiding power
> Which rightly suffers wrong,
> Gives vice to bloom its little hour
> But virtue late and long!

The letter of introduction from Richard Rush to President James Monroe, which has been referred to above, contained sentiments of warm esteem and appreciation of Barton's professional standing. It refers to him as enjoying and in a very high degree deserving "the respect and esteem of all who have had the pleasure of his acquaintance. In speaking of his service in the Navy, Rush states that "he (Barton) exercises its duties (*i. e.*, duties of his calling) with equal credit to himself and advantage to the service . . . the opportunities of a long acquaintance enables me to certify, in the warmest terms to his permanent worth." In answering the interrogatories sent to him by the court, President Monroe referred to Dr. Barton as follows: "My own impression was also favorable to him, proceeding from what Mr. Rush had said, from my great respect for some of his relations, distinguished for their literary attainments, and the interest I took in the welfare of his mother. My impression now is that the doctor urged his claim in his observations to me with delicacy towards his opponent and modesty to himself."

Between the years 1814 to 1818, during his period of duty at Philadelphia, he completed and published two works on botany, one, the "Vegetable Materia Medica of the United States, or Medical Botany," con-

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taining a botanical general, and medical history of medicinal plants indigenous to the United States, a two-volume work, and the other the "Compendium Floræ Philadelphiæ," containing a description of the indigenous and naturalized plants found within a circuit of 10 miles of Philadelphia, also in two volumes. On October 17, 1814, he read a paper before the Linnæan Society, of which he was president, on Holcus bicolor, a plant used in Lancaster as a substitute for chocolate. In the year 1820, there appeared his "Memorial from the Professor of Botany in the University of Pennsylvania, to the Trustees of that Institution," praying for the removal of the professorship of Botany from the faculty of Natural Science to the Medical faculty, and urging that botany be added to the subjects requisite for the attainment of a medical degree.

These works reveal Barton as a scientist of great ability and are evidence of his zeal in rendering available a knowledge of the general and medical botany of the United States.

Barton's fellowship in the College of Physicians lapsed for some reason in June, 1822, and, while there is little evidence to support this view, it is thought that this may have been the result of some local disagreement growing out of the movement to found another medical school at Philadelphia about this time. As early as 1818, Barton had endeavored to obtain a charter for a new medical college, but this was strenuously opposed by friends of the University of Pennsylvania, and the efforts of Barton and his associates proved unsuccessful. Seven years later, however, the Jefferson Medical College was established.

At this time or a little later Barton appears to have been placed on half pay, and in 1823, there is evidence that he lost even this income from the Government, for in a letter addressed to the Secretary of the Navy, dated April 26, 1823, he refers to being "cut off from pay by Act of Congress one year ago." In speaking of his circumstances in this letter, he refers to his writings as quite unremunerative, and of his salary as Professor of Botany as being only $120.00 a year, but even this has not been available for the present year as there was no class in botany. The letter finally leads up to a request to be allowed to remain in Philadelphia for financial reasons, and because of the state of his health, which is attested as unsatisfactory by three physicians whose certificates he encloses. On April 28, 1823, in spite of the foregoing, he is ordered to proceed by water to Norfolk and join the *Congress*. A letter follows, promptly written to President James Monroe, requesting the revocation of the orders, on account of an engagement he has entered into to finish a book entitled, "A Flora of North America," which it develops is dedicated to Monroe. This book is to be illustrated by colored figures, drawn from nature by Barton, and colored by his wife. His orders to

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the *Congress* were revoked May 1. On November 29, 1824, he writes to the Secretary offering free instruction in botany to any medical officers who may be stationed in the vicinity of Philadelphia. On the back of this letter is a pencilled approval by the Secretary, with directions that instructions be written to surgeon's mates in Philadelphia to avail themselves of the offer. On May 12, 1825, orders were issued to Dr. Barton, for duty at the "Navy Yard and Station, Philadelphia." These orders probably referred to his duty with the Board of Medical Examiners established there about this time, as correspondence between Barton and the department now begins to appear, dealing almost exclusively with matters pertaining to this board, and the letters extend over the succeeding four or five years. It was during this duty that Barton sought for and obtained substantial improvements in the methods of securing properly equipped medical officers for the naval service, and also, largely through his efforts, that certain professional qualifications were required for promotion. His interest in this subject is very well expressed in a letter dated March 11, 1831:

> Conceiving it of the utmost importance that a surgeon of the Navy should be a man of an exceptional character and habits and good education, either by the usual academic opportunities or such other successful exertions, and conceiving also that his literary acquirements should be so respectable that he may not disparage, by comparison, the literary and scientific character of his country, when he shall come by conversation and professional intercourse with the enlightened medical officers of the English, French and Spanish navies and armies, to invite such comparisons, the board determined that it was proper and would prove useful to meritorious individuals, and certainly beneficial to the service, to require of each candidate for promotion answers and documents asked for in the accompanying circular. (Certificates relating to moral character, etc.) Several have immediately complied in a manner not only altogether satisfactory but redounding to their credit in the eye of the department, when their credentials, which will form a part of the records of the proceedings of this board, shall come before you. It is presumed that those who cannot procure testimonials of correct habits and moral conduct do not deserve them, since the board believes that common, even-handed justice will oblige every conscientious surgeon to report truly the points of his assistant's behaviour on which he may be interrogated, especially as the requisition for such report is predicated on your instructions. The board have consequently decided that with your approbation the course commenced will be pursued. The board have directed a similar circular to be addressed to candidates for admission.

On May 4, 1829, orders were issued to Barton for sea duty in the Mediterranean squadron, but they were revoked on May 18, for reasons which are not revealed. A letter written May 30, 1829, to the Hon. John Branch, Secretary of the Navy, acknowledged the receipt of an order appointing him a member of a board of three medical officers required by a resolution of Congress to give separate opinions on the necessity or expediency of distilled spirits constituting a part of the ration

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allowed midshipmen, and on September 16, he transmitted his report on this subject, with a statement in explanation of the long delay, saying he desired to hold his report in order to reflect upon his conclusions sufficiently, and to change them, if more mature consideration seemed to warrant. But he stated that his opinions, as framed originally, were unchanged. The views he held on this subject are expressed in full in his book, "Hints for Medical Officers Cruising in the West Indies," published in 1830. In a footnote in this book he refers to the above reports, and states that—

> A more robust and vigorous state of health could scarce be found, than generally prevailed in the steerage . . . and yet these gentlemen are well deserving the remark, one and all, of most entire temperance; having drunk water only in their messes, during the whole cruise. . . . The point of temperance just noticed shows how much good a medical officer may effect, by precept seconded by example. I instilled the importance of temperance—my pupils knew me to be their friend. They gratified me by acquiescence. They were healthy, happy and have been commended by the department for their example. . . . If any medical man of the Navy would expect to be valued for any advice, relative to temperance, he must set the example by his own habits, of the precepts he would inculcate. If a medical officer shall drink brandy, with what face can he recommend other officers to discard it as pernicious? If any professional men are imperatively called on by every sense of duty and propriety, to practise temperance, it is the medical officers of the Navy. So much do I despise this practice in medical men, especially of the Navy, that I shudder when I see one take brandy and water. I do more, I fear and mistrust his professional efficiency and skill. I unhesitatingly declare, that I will ever strive by my vote and influence to keep out of the corps any who may desire to enter it, whom I may have reason to believe addicted to so dangerous a license in his habits. And I also declare I will never give my vote, if I am on the board of examination, for the promotion of any assistant to the rank of surgeon, whom I know to forget, by habitual stimulation, what is due to the high trust reposed in him; and this I would do, let his talents or qualifications be ever so good. For, how long could they be useful to himself or the service? Besides this consideration, his bad example is ten fold the more hurtful, by reason of his being a medical man. A brandy-drinking *physician*! I cannot conceive of such a thing—I will not admit it to be possible. I trust there are none in the Navy. If there be, shame on them to smirch their calling. If, I repeat, there be any "*bingo*" or "*blue ruin*" doctors in the Navy, they should not be there.

On December 27, 1829, he acknowledges receipt of a letter from the Secretary which directed him to hold himself in readiness for duty on the *Brandywine*. This vessel was fitting out for special service in the Gulf of Mexico, and on January 4, 1830, Barton reports for this duty to Commodore Isaac Chauncey at New York. He remained on the *Brandywine* until July 12, 1830, and then was on leave until September of that year. It is probable that he employed this interval in writing the "Hints for Naval Officers," mentioned above, which was published in September, 1830. The *Brandywine* proved to be a damp, hence a sickly ship, and during the cruise she was exposed to all the malign

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influences attributed to a West Indian climate, from which, however, the personnel came home in much better condition than was usual in those days. In the "Appendix" to his "Hints" appears a letter dated March 10, 1830, written on the *Brandywine* (near Sandy Hook), addressed to the commanding officer, Captain Ballard, which makes it clear that Barton was fully aware of the difficulties of maintaining the health of a ship's crew during a cruise in the West Indies in those days, and that he was keenly alive to many of the principles of hygiene which must be applied to safeguard health while there. His views regarding the non-contagiousness of yellow fever followed those of Rush, but he states its causes as plural, "the sun, the dews and the rains."

The ship had passed the winter in a northern climate, a season characterized that year by great severity and unusual length. As a consequence, the whole crew was transferred from the receiving vessel with heavy colds. The following day presented a sick list of fifteen, In one week there were forty, and after the lapse of a few days more, the sick had mounted to fifty-eight. "With two or three exceptions, all of these were afflicted with the diseases arising from intense and continued cold; such as frosted hands, fingers, toes and feet, chilblains, pleurisies, pneumonic affections, etc. One midshipman and five men were sent to the naval hospital with scarlet fever for the indispensable benefits of fire and other comforts. . . . In view of this state of the crew and of the fact that the ship will be in the West Indies during the season most favorable to the fatal endemic disease of that region, I cannot withhold the opinion—that a disastrous result of the cruise will most probably attend its termination." Barton therefore advised the continuance at sea as much as possible and the avoidance of Havana and other unhealthy ports. On July 7, 1830, the ship was back in Hampton Roads, having visited Santo Domingo, Havana, Vera Cruz, Tampico and Pensacola. During the cruise 488 sick had been admitted to the list, comprising various ailments, but including:

> A great proportion of cases of typhoid, pneumonia, scarlet fever, low fever of tertian and quartan types, diarrhea and rheumatism, diseases generated by dampness. When this dampness became a heated moisture as it soon did in the West Indies, the cases of fever were of extremely dangerous aspect, and the pneumonic and anginose affections general, and excessively distressing and difficult to manage. Sore throats running to ulceration, with dejected spirits and low state of the system, accompanied more or less, all the cases. I attribute the sickly condition of this ship . . . chiefly to an unpropitious winter . . . a foul hold and lower apartments, a bilged well, and perhaps some other causes not now necessary to be mentioned. . . . Had the *Brandywine* continued two or three months longer in the West Indies, I have no doubt that the yellow fever would have made sad havoc amid her officers and crew. Such a damp, ill-ventilated and wet ship should not again be sent thither.

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In spite of the insalubrious record of the ship in a previous cruise, during which she lost forty of her crew from disease, Barton reports only ten deaths, and of these only two died from "fever induced by the climate," which Barton alleged was not yellow fever, as the cases "wanted the gastric affection of that disease."

As there was considerable evidence of a foul hold, after arrival at Norfolk, and upon Barton's urgent representation, the ship was evacuated of personnel and the hold broken out. This was found to be in an excessively foul condition. On the expiration of his cruise on the *Brandywine*, on July 12, 1830, Dr. Barton was granted unlimited leave, but on September 2, 1830, he received orders to the Norfolk Hospital, and here he remained until December 1, 1831. Little is to be found reflective of his activities during this period. Soon after his arrival there he requests that a suitable boat and boat's crew be furnished the hospital, and there is correspondence with the department relative to the rations of hospital patients, and their laundry. For a number of years subsequent to his Norfolk duty, Barton was president of the Medical Examining Board at Philadelphia, in which position he introduced many reforms governing the examination requirements for candidates for admission, and for promotion. In this work he always had the interests of the service at heart, but he was by no means blind to the individual officer's rights and privileges.

On June 10, 1833, he writes to the Secretary of the Navy stating that a vessel had just arrived from Manila, on which is a Dr. Burroughs, who has a limited quantity of essential oil of camphor and oil of cajuput. This he states was the first importation of these medicines into America, and Barton being anxious that the Navy should benefit from an opportunity to test their reputed virtues, particularly the oil of camphor, said to be a sovereign remedy for cholera, recommends the purchase of a few bottles. The camphor is quoted at $15.00 per bottle and the cajuput at $22.00. The Secretary's pencil memoranda on the back of Barton's letter approves the purchase of two bottles each of these medicaments, and suggests that their contents be split up into a number of smaller bottles for distribution to the service, the larger number to go to the hospitals at Norfolk and New York. We hear nothing, however, of results of the use of these remedies. In 1827 Barton published another book entitled, "Outlines of Lectures on Materia Medica and Botany delivered at the Jefferson Medical College, Philadelphia," and in 1833, the "Prodrome of a Work to Aid Teaching of the Vegetable Materia Medica by the Natural Families of Plants in the Therapeutic Institute of Philadelphia." It was the latter to which he referred in a letter written in December, 1833, asking whether the department would purchase this vol-

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ume in a number sufficient to provide one for each surgeon and surgeon's mate in the service. The action of the Secretary on this request is not recorded. In March, 1836, there comes to light a letter to the Secretary which deals with an interesting incident, namely, the duel of his son, Midshipman Charles Crillon Barton, with another midshipman, while serving in the eastern Mediterranean under Commodore Jesse Duncan Elliott. Young Barton was badly wounded and remained in Smyrna for over a year under treatment and awaiting transportation home. He is under arrest for trial for duelling, and his father prays for his release, basing his appeal for this action largely on the unusual circumstances of the duel, and Commodore Elliott's treatment of young Barton, which he alleged was inhuman. Barton's letter is a most eloquent appeal, and is moreover instructive as showing his views on duelling, "That it is an evil," he states "admits of no disputation."

On September 6, 1836, Dr. Barton declined an offer of duty as Fleet Surgeon of the Pacific under Commodore Ballard, alleging as reasons that he is the only support of his mother, now seventy-seven years of age, and of other members of his family, except his brother, who is about to leave for Europe to be gone two years. His reluctance to accept orders to this station may have been due also to the fact that he had made a cruise with Captain Ballard in the *Brandywine*, and their relations then had not been altogether happy. He refers to this in a letter written to the Secretary of the Navy, from Pensacola, September 1, 1848, in which he seeks to justify himself for having acted independently of the commanding officer of the station in a matter which he considers was one concerned solely with the internal administration of the hospital, namely, the proper apparel of the slaves employed as attendants, who are "not only destitute of decent vestments but in absolute rags." His reference to Captain Ballard is as follows:

> My personal relations with them all (*i. e.*, his commanding officers) with the single exception of Captain Ballard, were harmonious and kind, with an interchange of social courtesies. I have always believed and said that the medical officer who cannot get along harmoniously and in common interest for the good of the sick, must look to himself, almost always, for the fault.

On December 28, 1836, he transmits to the Secretary a copy of the "Elements of Botany," by his uncle, the late Benjamin Smith Barton, which he has re-edited and to which he has added a biography of the author. He suggests that the book be added to the list of books for naval libraries of ships.

On February 8, 1837, he writes to Andrew Jackson, then President, urging the necessity of an increase in the surgeon's list. A similar communication was previously sent to the Secretary of the Navy and was

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signed by a number of the senior medical officers in the service. On June 3, 1837, he acknowledges the receipt of an order to convene the Medical Examining Board (Board of Naval Surgeons) of which he is president, adding the following comment:

> Important as I think and always have though the duty of these examining boards, in reference to the respect and efficiency of the Navy, so far as these are involved in the education, skill, and unquestionable moral character and good habits of the medical officers who may be admitted, I shall use my strenuous efforts and my best judgment to execute faithfully and conscientiously the duty you have assigned me and to realize he virtual object of the law on which that duty is predicated.

In June, 1839, Barton was called upon by the Secretary of the Navy for his ideas on recruiting and physical standards of recruits. This was a subject in which he was keenly interested, and in his work on "Marine Hospitals" he had written at length on the defects of the system of recruiting in vogue and suggested many improvements. In his letter to the Secretary he invites attention to the fact that existing regulations require a second examination of recruits by surgeons of the yards before the recruits can be receipted for by the commanding officer of the receiving vessel. The object desired is the exclusion of unfit subjects from the service. The recruiting surgeon ought to be a responsible examiner.

> If the medical recruiting service is to be revised and amended it ought to be thoroughly done, so that responsibility will be placed where the specific duty naturally places it, with the recruiting surgeon. I think the present received understanding of the nature and object of the second examination has a tendency to lead to laxity in either the recruiting surgeon or the second examiner, which must be prejudicial to the service, since a division of responsibility in any duty leads to such effect.

On August 17, 1841, he acknowledges receipt of an order for duty at the Naval Asylum, Philadelphia, as attending surgeon. On August 19, 1841, he urges reforms in the uniform dress of medical officers and requests permission for them to wear one and two epaulettes, enclosing engravings of army uniforms and regulations for medical officers of the Army governing this subject. He refers also to the discrepancy in pay between medical officers and those of the line, and the difference existing between them as regards promotion.

> I now presume from length of service to prefer for my colleagues more especially, as I am free to confess that I have no desire myself for any distinction or embellishing dress of any kind, but recollect when I was young how I thought and felt on this point. I ask for others what I did not myself crave. I submit a plan for uniform and epaulettes which I trust you will find in good taste.

Barton was not an advocate of the principle of selection in the promotion of officers, and he inveighs against it vehemently. In

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doing so he does not deny that recommendation to preferment should be based upon merit also, but he insists on combining service with this as necessary.

> I cannot in this place silently pass over, without noticing the consequences of it—the violation of that principle which is the life of naval and military service—I mean that which enforces the observance of seniority in the advancement of officers of whatever grade. The infringement of this principle demands the united efforts of the officers of the Navy to discountenance and abolish it. It is not only unjust in itself, but destructive of the honourable pride and comfort of officers, and eminently subversive of that harmony, order, and subordination, which constitute the very existence of a well regulated navy. Merit and service should never be neglected or forgotten. When appointments are founded on injustice, or made under the influence of favour they must, in the nature of things, be no less destructive of the individual happiness of officers, than inimical to the contentment of the men.

On September 1, 1841, he submits certain suggestions for the good of the service in relation to assistant surgeons, and states that lasting good must come to the medical officers from their adoption. He also recommends that the Surgeon General of the Army make similar suggestions to the Secretary of War. "If an old medical officer of the Navy thinks, nay, is confident he can benefit the Service in this way, perhaps it will not be deemed intrusive that he does so. How is the department to get medical views?" These suggestions may be summarized as follows:

1. Recommends that three years' sea service be required as a probationary period preliminary to examination for promotion, instead of "at least two years," as at present in the regulations.

2. That assistant surgeons be required by circular from the department to perform all the minor operations directed by the surgeon, as bleeding, cupping, etc., and the dispensing and compounding prescriptions in their own person, not by delegating any of these to a "loblolly boy," hospital attendant, dispensary steward or a man nurse. In short, not to delegate these things to anyone. They constitute the business of an assistant surgeon, and unless he executes them he positively has no business to do, becoming the fifth wheel to the coach. These officers inspire confidence in the men and officers, and he adds, "What is physic without confidence—a loaded gun without the spark to ignite."

3. Assistants ought not to be allowed to alternate the duty of prescribing with the surgeon, and ought only to prescribe in his absence.

4. A medical and surgical journal ought to be kept by them to be presented to the board on their second examination. The department might furnish an outline of the kind of journal. It would discipline medical thought and induce reading.

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5. When a medical officer acts as surgeon he should still not delegate his business to irresponsibles.

Thus we see how Barton paved the way to many reforms, adopted one by one in subsequent years, until now most of them have become part and parcel of naval practice.

On June 13, 1842, he writes and refers to his letter of the 19th of August, 1841, written in Washington, relative to epaulettes and uniform for medical officers, and directs the attention of the Secretary to this former letter, adding:

The late Board, after their labors were over, feeling a deep interest in the consequence and respectability of the Medical Corps and under the full belief that you would willingly receive any suggestions they might make, calculated in their convictions to promote this consequence and respectability, have predicated on my proposition and suggestion in reference to the subject mentioned, and requested me to forward the document.

This I now do with an earnest hope that you will acquiesce in the reasonable request made for the Corps. There is no doubt that Medical Officers, the oldest equally with the youngest surgeons, feel acutely, and especially in ships' service, their nonentity in the pageant part of discipline, and it would be affectation to gloss over the fact that Commanders and others representing them take no pains to prevent cause for feeling its nonentity. The epaulette and epaulettes will, if allowed, go far to abate this grievance, though nothing but a positive accredited rank will wholly reject it. I am sure of this, strange as it may seem in the abstract view. It is consistent with military show to be so. To conclude I must repeat with emphasis what I stated in my communication of the 19th of August, that what is asked for is usage in the English Navy and other foreign navies, and is usage in the United States Army.

Section IX of his book on Hospitals, 1814, dealt with the propriety of establishing the rank of navy surgeons. In this connection he states:

It will be a matter of surprise to those who are ignorant of the fact, to learn: that at this late period of our naval establishment, the rank of a grade of officers confessedly among the most important of those who compose the Navy, is not yet determined.

The inconveniences and disadvantages of this omission are well known to the medical and other officers of the service. I have sorely experienced them; and would venture to assert, that every surgeon in the navy has at some period or other of his service, also felt the effects of his indefinite standing as respects other officers of the Navy. . . .

If it is ever expected that men of talents and education, who have spent much of their time in acquiring such knowledge of a difficult, a laborious, and, to most persons, a painful profession, as will enable them to serve their country with advantage, will enter and continue in the naval service: the rank of surgeons *must* be established. And this rank should be sufficiently respectable to give them a consequence among sea-officers that they have not.

For my part, I cannot but believe it essentially necessary for the welfare of the navy, that this establishment of rank be immediately made. The error is old enough, and sufficiently productive of bad consequences, to demand a quick and efficient reform. When this is the case, we shall not have surgeons who have just continued

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long enough in the service to be well acquainted with the nature of sea-duty, and to be of course the better prepared to benefit it by their experience, becoming disgusted with their unimportant situation, and leaving a service productive neither of emolument nor increasing respectability. I do hope therefore that this subject will claim the attention which it so eminently merits. Persuaded as I am that when naval surgeons are placed upon a more respectable footing than that they now hold, the expediency of the regulation will be manifest to all, I must strenuously urge the establishment of rank, as I have done the necessity for an augmentation of pay.

On September 2, 1842 Barton received the unsolicited honor of being selected as the Chief of the Bureau of Medicine and Surgery, a newly created office in the Navy Department. The selection was made from among the sixty surgeons then in the Navy. His position now furnished him the desired opportunity for inaugurating the many reforms he had long advocated as necessary to correct abuses and irregularities in the medical department of the Navy. As early as 1814 he had written: "The same independence which caused me to hold up my hands against the abuses of the medical department of the navy, emboldens me to expose them." He consistently followed this policy while Chief of Bureau, and as in earlier days his "independence in expressing his sentiments on points of duty, in the Navy," made not a few enemies for him, so in this position he found himself assailed "for correcting abuses of indubitable existence." Unfortunately, upon the assumption of this office, the letters which have formed such a satisfactory source of information cease almost entirely, and the only letters reflecting his work in the bureau relate to a period subsequent to the retirement of the Hon. A. P. Upshur, as Secretary of the Navy, with whom Barton was on most friendly terms. Not so, however, with his successor; and Barton's correspondence with the latter indicates strained relations and a lack of harmonious coöperation, which may have had much to do with his relinquishment of the office of Chief of Bureau in April, 1844. In his efforts to prevent undue waste and carelessness in the expenditure of medical supplies, particularly with respect to liquors in the medical department aboard ship, he was led to issue a "liquor circular" designed to be pasted on the inside of the lid of medical liquor cases. This circular established the contents of the case as medical supplies, and required them to be restricted to the use for which they were intended, namely, the sick. There was evidence that liquor was "borrowed" from medical supplies, and not always returned, and it was an abuse of this character which Barton aimed to correct. But the circular raised a storm from medical officers and others who considered their honesty impugned, and the whole subject had an airing in documents presented to Congress at the time the attempt was made to oust Barton from office. Barton's action, however, had the full support of the Secretary and of many officers in the service, who were aware of this

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abuse of liquor. One of the most flagrant examples of this abuse was alleged to have taken place in the Florida squadron, and Barton's strictures on this particular expenditure brought down on his head the bitter enmity of the squadron commander, Lieutenant McLaughlin.

A single copy of Barton's first report as Chief of Bureau, dated December 1, 1842, was discovered in Washington, and it reveals his many difficulties, financial and others, in establishing the bureau and in effecting the reforms he looked upon as necessary and essential to efficiency. Some of the details of this report show a shocking state of public morals regarding medical expenditures, and to the correction of these Barton addressed himself unflinchingly. I will refer only to one item as illustrative of the conditions prevailing at this time. Barton found that out of the appropriation for "medicines, surgical instruments, etc.," there had been expended at one institution "for 31 blue coats, with navy buttons and a silver star ornament; 31 blue cassimere pantaloons, and 31 blue cassimere vests with navy buttons," the sum of six hundred and sixty-five dollars and fifty-seven cents!

In this first report of a Chief of Bureau there is a recommendation which touched the efficiency of every medical officer in the service. It is, "That a small compact medical and surgical library shall be authorized to be purchased for each vessel of war, in proportion to the size and capacity for the accommodation of books in the surgeon's department, and also for hospitals and sick quarters at navy yards. . . . Extensive and costly libraries are furnished by Government to the commanders of all ships in the Navy, often embracing a large proportion of mere general literature. Professional works, so important to medical officers, should not be denied."

Among the "Executives" letters filed in the Navy Department Library I discovered one from the Secretary of the Navy to the President, dated February 5, 1844, which refers to charges preferred against Dr. Barton by Lieut. John T. McLaughlin in the previous August. The exact nature of the charges does not appear, except to specify "gross official misconduct," but Barton apparently had made no reply to the department's request for explanation, and Lieutenant McLaughlin preferred another charge against him in October, 1843, which was also referred to Dr. Barton, but this remained unanswered like the former. I have searched in vain for some more precise information covering these incidents, but have found nothing. It will be recalled that McLaughlin was the officer in charge of the Florida squadron in which Barton had alleged there was an undue expenditure of liquor from medical department supplies, and the conditions in that squadron in this respect were brought forward by Barton in defense of

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his celebrated "liquor circular." Two thousand and seventy-six dollars worth of liquor were procured for the sick in a period of about eight months, the number of persons in this command being in the neighborhood of six hundred. Barton had asked what had become of the liquor. Did the sick consume it all, and was it necessary? This had aroused Lieutenant McLaughlin's ire, and it is not improbable that these charges were inspired by Barton's comments. In the Judge Advocate General's Office there is evidence of a Court of Inquiry on Lieut. John T. McLaughlin dated September 24, 1845, and thinking that a study of this record might throw some light on the allegations made by McLaughlin against Barton, or be in some way connected with them, I sought out the record, only to find it missing, and so this matter remains a mystery which I have been unable to unravel.

Dr. Barton's letter of resignation, which I include here, closes the chapter on this period of his career. It is dated March 20, 1844, addressed to the President, and shows his state of mind regarding his labors in the office he is about to leave:

Without the slightest knowledge of the honor intended me by an appointment by you to this bureau, or indeed without knowing of the existence of such an office, I received, early in September, 1842, an official notification that the Senate had confirmed the nomination you had made of my name as its Chief. Doubting the popularity of the office, if strictly organized and executed throughout its parts, the appointment was not grateful to me, yet though the acceptance of it was a severe pecuniary sacrifice which I was unable to bear, as well as an interruption of the peaceful performance of my public serivce at my home, and with my family of females (whom I was obliged to leave unprotected), still the sense of duty overpowered these conditions. I therefore entered on the new duties assigned me with a determination expressed to the Secretary of the Navy at the time of doing so, of retiring within a year. After nearly twelve months' arduous labor devoted with conscience and zeal, duly appreciated by the lamented Mr. Upshur,[6] to devise and carry out a system of regulated requisitions and responsibilities in the Medical Department, I had determined, having become extremely ill, to send in my resignation last July. I was deterred from this act at that time, and subsequently by the urgent advice against the measure of the late Secretary of State, just named, and yielding to his wish and influence as to that of a valued and tried friend who knew my cause and views for public good in the Bureau, I continued reluctantly to exercise my efforts to realize the system of retrenchment, reform and responsibility I had adopted and put in force, and he had approved, and which however consciously I believe they know to be necessary, seems to have met with difficulty, opposition and unpopularity. My earnest wish therefore has long been, and now is, to retire from the scene of unavailing efforts. This I requested to be conveyed to you by a third person in your confidence, some weeks ago. I have done my duty to you and my best for the good of the country. No man can do more. I beg therefore now to tender and I do hereby tender my resignation as Chief of the

[6] On the resignation of Daniel Webster in 1843, Mr. Upshur became Secretary of State. On February 28, 1844, in company with the President and his party he visited the U. S. S. *Princeton* on the Potomac to witness the testing of a big gun. It exploded in the experiments and Secretary Upshur, together with several others of the party, was killed.

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Bureau of Medicine and Surgery of the Navy Department to take effect on the first of April next, and hope while so doing you will not consider it improper but only just to myself to request that you will do me the favor by that date to have me returned on duty as a surgeon of the Navy Department of the Philadelphia station.

Barton was succeeded as Chief of Bureau by his former prosecutor before the court-martial in 1818, Surgeon Thomas Harris.

After this we have little information regarding his activities, but it is not unlikely that the wish expressed in the final paragraph of his letter of resignation was gratified and that he went to Philadelphia. In February, 1848, he is ordered to hold himself in readiness for duty at the Naval Hospital at Pensacola, Florida. He remained here only a few months, being relieved by Dr. Hulse on September 1, 1848. Two letters from this hospital were discovered, in handwriting, alas, which is no longer as legible as it was in the earlier years of his life. One bears date of July 18, 1848, and the other September 1, 1848, the former addressed to a Mr. Innerrarity of Pensacola and the latter to the Hon. J. Y. Mason, Secretary of the Navy. Both these letters discuss the question of clothing for the slaves employed in the hospital as attendants. Some of the owners of these slaves had neglected to furnish what Barton considered necessary either in clothing or in a money equivalent with which the slaves might purchase clothing.

In 1852 he is again president of the Board of Examiners at Philadelphia, and apparently remained here until his death on February 29, 1856.

The North American and United States Gazette, Philadelphia, for March 1, 1856, contains his obituary notice, as having died on the morning of the 29th ultimo, and inviting relatives, friends and officers of the Navy, Army, and Marine Corps to attend his funeral at his late residence on Chestnut Street at 2 o'clock on the 2d instant. Under date of March 3, the same paper prints an account of the funeral and the interment of the remains at Laurel Hill. A detachment of marines was detailed from the Navy Yard to fire over his grave. The cortège included representatives from the local military bodies, Army, Navy and Marine officers, and the Pennsylvania Cornet Band preceded the procession, performing music appropriate to the occasion. Dr. Barton's grave is on the hillside overlooking the Schuylkill and is marked by a simple headstone, inscribed with his name, the date of his birth and the date of his death.

APPENDIX

The appearance of Dr. Barton's work on "Marine Hospitals," in 1814, marked an epoch in the history of medicine in our service. This book disclosed a mind capable of appreciating the vital problems of

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naval hygiene, their significance in relation to the health and comfort of seamen, and an ability to apply constructive improvement in sanitary conditions, which few, if any, of his contemporaries possessed. His writings give evidence of extensive study of the literature of naval and military medicine. He makes specific references to the works of Blane, Lind, Clarke, Trotter, Turnbull and Larrey. Many of his suggestions for reform or improvement were looked upon as revolutionary, and as unnecessary innovations. It is only by perusing his two books on naval medicine that we can form an adequate idea of the extent of his activities in this field.

It was in February, 1814, that Dr. Barton's "Treatise on Marine Hospitals and the Medical Department of the Navy" appeared. The full title of the second edition of this book I have given earlier. The first edition did not contain the "Observations on Military and Flying Hospitals" which appears in the second edition. The first edition was dedicated:

To the
Flag-Officers, Captains and Surgeons
in the
Navy of the *United States:*

A Navy, rendered glorious by the brilliancy of its achievements and which has added lustre to the nation—giving dignity and importance to its character abroad:
A Navy, to the seamen of which, by their prowess and their victories—the skilful, the valorous and the hitherto unconquered naval sons of Great Britain, are forced to yield the palm of superiority:
A Navy, thus eminently distinguished even in infancy—and which has conquered its way to publick favour and estimation:
This attempt, to promote its interests is most respectfully dedicated by the Author.

Then follow a number of recommendatory letters from prominent medical men in Philadelphia, including Dorsey, Coxe, Chapman, James, Hartshorne, Hewson and Barton. The book is divided into two parts, one dealing with "A Plan for the Internal Organization and Government of Marine Hospitals in the United States" and the other with "A Scheme for Amending and Systematizing the Medical Department of the Navy of the United States, with a few Observations on the Expediency of Altering the present Ration; and Promoting the Better Ventilation and Warming of Ships, also some Strictures on the Practice of Frequently Wet Scrubbing the Decks in the Winter Season and the impropriety of Shipping men of the United States Vessels without a Strict and Conscientious Examination by a Surgeon or Surgeon's Mate, of their Efficiency as Able-bodied Men."

Barton explains in the preface of the first edition that the idea of the book originated in a request made to him by the Secretary of the Navy

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in November, 1811, to submit his ideas "respecting the proper and systematick mode of conducting institutions of this nature (*i. e.*, Marine Hospitals), as well as any suggestions for the internal organization of the household as might seem to me consistent with economy and truth." The finished book contained considerable additions and emendations. He speaks of the many opportunities he has had during his sea duty of observing irregularities in the medical department and the disastrous consequences attending them, and in his book he endeavors to point out the means of correction. He states that if the propositions and suggestions exhibited in the book be thought worthy of adoption and if they shall be found calculated to achieve the object they have in view, "I shall deem the five years I have devoted to the naval service, not passed in vain. . . . I have been long enough in the Navy to have its interests much at heart, even if I did not believe (which I certainly do) that its existence is vitally important to our national prosperty and honour."

In the preface to the second edition he speaks of the fate of the book as somewhat remarkable:

> It was written by the request of a late Secretary of the Navy at a period when the youth of the Author (then but four and twenty) caused him to think of executing the task with diffidence. . . . The work, however, was flatteringly recommended. . . . Notwithstanding these unqualified testimonials in its favour . . . the work lingered for a short time on public view, and was then forgotten. An ineffectual attempt was made in March, 1814, to bring it to the notice of the naval committee of Congress . . . to lay before its members a knowledge of the irregularities and abuses of the medical department, for the reform and correction of which the author had proposed what he believed a feasible scheme. It resulted however in an indirect reference . . . to the Secretary of the Navy. . . . It is plain from this exposition, that the author had but little reason to be satisfied with the present, or sanguine respecting the future reception of his work. Yet, though not insensible to the palsied touch which seemed to have reached it, candour compels him to acknowledge that he never despaired of its ultimate success. . . . The work has finally worked its way into notice and favour. It has been patronized both by the navy and war departments . . . and although but three years have elapsed . . . a new edition is called for. . . . For this estimation of its merit, the author takes this opportunity of rendering his thanks to those medical gentlemen, by whose passport it has at length gained admittance to the chamber of the great, after a chilling and tedious tarry at the portal, and many frowns from one of the servants in waiting.

An idea of the scope of this work may be gathered from a mention of the subjects treated in it. The opening section contains observations on the necessity of establishing marine (naval) hospitals in the United States. Barton refers to the law which authorized the establishment of these institutions and to plans submitted to the Secretary of the Navy by the engineer, Mr. Latrobe. In adducing reasons why hospitals should be provided he remarks:

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Nothing causes seamen to discern alacrity, promptitude and faithfulness, in the performance of their severe and arduous duties . . . than a certainty of being attended humanely and ably by the superintendents of a medical department replete with every comfort and convenience for the sick and afflicted. . . . While on the other hand the neglects, irregularities or inability, of the medical officers, never fail to create discontentment and disgust. In the petition . . . made by the delegates of the English fleet at Spithead, in the ever memorable mutiny . . . in the year 1797 . . . one of the principal articles referred to the neglect of the sick on board the ships . . . it was deemed prudent and expedient to issue new orders from the office of sick and wounded seamen, respecting the medical department, the strict observance of which was required of the surgeons.

The second section presents a sketch of the marine hospitals of Europe, including the Royal Hospital for Seamen at Greenwich, the Chest at Chatham, the Royal Hospitals at Haslar, Plymouth, Deal, Yarmouth and Paignton and the Chelsea Hospital; the Forton Prison Hospital for French prisoners near Portsmouth and the medical departments at the Royal Navy Yards. He also describes the French naval hospitals at L'Orient and Cherbourg.

It will be recalled that Barton had just come from abroad in the *Essex* and the data for this section had been obtained on this cruise. He refers to having been at Cowes, Isle of Wight and at Barnpool (near Plymouth) during the time abroad, and seems to have visited St. Thomas', St. Bartholomew's, Guy's and St. George's Hospitals in London. His descriptions are full and painstaking, and it is not unlikely that they were based on personal observations, although he does not state how he obtained the information regarding these institutions. In Section III he deals with the principles which he considers should govern the administration of naval hospitals and it is here that he quotes Turnbull, an English naval surgeon, in support of the proposition that naval medical students should be instructed in anatomy, surgery, and clinical practice at the principal naval hospitals, thus constituting them "schools of naval surgery," with the object "that young men should enter the medical sea service . . . not mere tyros in their business but . . . well versed . . . in naval medicine and sea surgery; but intimately acquainted with the nature and treatment of those diseases which are incidental to a sea-faring life." He asserts that "the general administration of marine hospitals should be of a military nature" and that "the salaries of the different officers should be as liberal as is consistent with a due regard to economy. . . . Medical officers particularly should be allowed such ample compensation, that they would have no inducement, nor be subjected to the necessity of resorting to private practice, in order to support themselves or their families. . . . All the officers of the institution should be furnished with houses or

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apartments within the limits of the hospitals." The succeeding sections of Part I of the book continue with questions concerning sites for hospitals, internal arrangements of hospitals, construction of bedsteads, dress, bedding, ventilation, warming, diet, reception of patients, duties of officers, nurses, orderlies, rules for patients, and an account of the Pennsylvania Hospital. The second edition contains the "Observations on Military and Flying Hospitals."

Part II presents his scheme for improving the medical department of the Navy. He remarks that "Schemes proposed by an individual to the Secretary of the Navy, are not likely to be well received, unless they be seconded by officers high in rank and reputation. . . . With some of these . . . I have frequently conversed respecting the deplorable want of system that marks the medical department of the navy. It affords me the greatest satisfaction to say: that I ever found them willing to give all assistance in their power."

Commodores Decatur and Rodgers and Captain Porter are mentioned as affording him support in the past.

Barton then takes up in detail his ideas for reforming medical administration in the navy. In the light of his experience on the *United States* and *Essex* he recommends the introduction of a systematic plan for furnishing ships with medical stores, and the establishment of regulations which will make the surgeons responsible for the just expenditure of articles. He mentions the chief points that require correction or reform as being: the introduction of the lemon acid, in abundant quantities, with free and liberal use in our ships; the present irregular mode of supplying ships and vessels of war with medicine and hospital stores; the laxity in the necessary checks to abuses that grow out of it; the faultiness of the regulations respecting the responsibility of the surgeon for the safe-keeping and proper appropriation of the articles entrusted to his charge, exclusively for the benefit of the sick; the alteration of the present ration, or at least the liquid part of it; the better ventilation and warming of our ships in the winter season; the practice of slushing down decks in winter; and lastly the impropriety, and pernicious consequences, to the service, of the present plan of recruiting, in which men are shipped without a strict examination by a professional man. He summarizes his ideas of naval hygiene as follows:

> With respect to the navy, which is my object at present, the regulations that are most to be depended on, for preserving and promoting the health of seamen, are such as have in view a diet of healthful quality, the personal cleanliness of the crews and the purity and free ventilation of the ships they inhabit.

In the section dealing with "the mode of furnishing the medicine

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and store chests" he recommends the adoption of a supply table, a model for which he exhibits in the text, with all the items specified, and suggests regulations for governing the storage and issue of medical supplies. The necessary blank forms for recording an account of the receipt and expenditure of medicine, etc., are described in full.

Section VI refers to a singular practice then existing in the Navy, namely, the payment to the surgeon of a fee, usually five dollars, for every patient cured of venereal disease, this amount being charged against the accounts of the sufferer, by the purser. Barton states with reference to this plan.

> It is true there is no established article of the navy laws to authorize the payment of such sums. But immemorial custom has given this regulation the importance and effect of a law.

He looks upon this practice as reprehensible and wishes it expunged from the navy altogether. He alleges that

> Seamen sometimes, but more frequently landsmen and marines, do frequently conceal their complaints for fear of being obliged to pay the doctor for their cure. This happens till the disease assumes a serious and not infrequently a dangerous aspect. They will purchase for a trifle, on shore, drugs enough to ruin them . . . or apply to the loblolly-boy . . . rather than make their complaint known to the surgeon. Can anything be more destructive to the health of the men, and of course to the good of the service, than a regulation that induces such conduct and such consequences?

Barton lays down in succeeding sections exact rules governing the duties of surgeons' mates, and devotes a section to a discussion of the expediency of giving surgeons proper military rank. Rationing and diet for seamen is reviewed at length and Barton presents a revised ration "for promoting and preserving health and morals of the seamen in the U. S. naval service." The section devoted to the ventilation and warming of ships emphasizes well-known principles of hygiene governing these subjects and recommends the more extensive use of windsails. He insists upon dryness of lower decks and inveighs against wet scrubbing of them in winter weather, quoting Trotter in support of his contention. The two final sections of the book deal with Barton's ideas regarding the examination of recruits, a matter in which he seems to have been a pioneer in our service, and with plans for improving the health of the men and the comfort of the sick by locating the sick bay further aft, isolating it by partitions, ventilating it "by tubes from the gun or main deck," and furnishing well-slung cots, etc. Other points covered are the proper location of the paint room, to avoid lead poisoning; the selection of a place for laying ships up in ordinary, free from damp and marshy exhalations; the provision of bunting sashes for lower deck ports; providing boats' crews with breakfast before they

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are sent on shore for wood or water; exercising supervision over "bumboats" to exclude spirituous liquors; preventing men from drinking river water, when ships are anchored in rivers; that "dancing and musick" be promoted and encouraged among the men; and finally, he closes with the statement: "The most willing coöperation of the commanders and other officers of ships, should always be afforded the surgeons, in any of his plans for meliorating the condition of the men and promoting the convalescence and cure of the sick." In the "Conclusion" he closes as follows: "I conceive that the country has a right to expect from every officer in the service, the result of his experience, if that can in any way lead to the interests of the nation. I therefore tender with unaffected diffidence, my mite towards the general weal." An "Appendix" contains a list of surgeons in the Navy in the year 1814. The second edition of this book was dedicated to Daniel Parker, Esq., Adjutant and Inspector-General of the Army of the United States, which apparently was meant to be a public acknowledgement of the patronage accorded the first edition of the book by the army authorities, who purchased it in quantity. In fact, the Army appears to have purchased more copies than the Navy, if one can judge from the letters printed on the page succeeding the dedication in this edition.

The "Hints for Naval Officers Cruising in the West Indies" was written and published in 1830, immediately following Barton's duty in the *Brandywine*. This small volume incorporates in book form two reports made to the Navy Department on "Ardent Spirits in the Ration of Midshipmen," which has been referred to previously, and a "Report on the Means of Preserving the Health of Seamen Previous to a Cruise." To these are added sections dealing with Use of Tobacco; Clothing; Sleeping; Restriction in Water; Temperance in Drinking and Eating; Miscellaneous Observations; Immunity, and a section dealing with the natural advantages of Pensacola as a site for a permanent naval depot. An appendix contains several letters written while on the *Brandywine*, touching mainly questions of hygiene. This work, while presenting valuable and interesting material, and necessarily reflecting a more mature experience in the service, does not possess as great a claim to commendatory notice as the preceding, and, moreover, it is written in a somewhat labored literary style.

In the *National Gazette*, Philadelphia, April 15, 1829, there appeared a notice of a treatise which was stated to be in course of preparation by the author of the "Hints," entitled "A History of the Navy of the United States." There is no evidence that this work ever reached the stage of completion.

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THE AMERICAN PHYSICIAN IN THE DRAFT AND IN THE SERVICE OF THE WORLD WAR [1]

By Major VICTOR COX PEDERSEN, A.M., M.D., F.A.C.S.
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THE broad subject has been covered by many previous authors—medical and lay, official and unofficial, ranking and subordinate—so that little really new is possible, but the experience of the author in the draft may offer different viewpoints on several topics through work in committee before the draft, through work in earlier days of the draft in the old arsenal of New York city under Roscoe S. Conkling, later lieutenant colonel, U. S. A., when all questions were being thrashed and when chaff and stubble were about as abundant as wheat; and through later work in the Selective Service Headquarters under such leaders as Roger B. Wood, Phillip J. McCook and Martin Conboy.

The work in committee before the draft is exemplified by the orders extended by the Surgeons General relative to venereal disease prevention and control among the camps and their environs in this country, and later in Europe at ports of debarkation, training stations and fighting fronts. In this city the work was begun at a committee meeting held at the City Club, attended by the Commissioner of Health of this city, the Commissioner of Health of the State or his representative, the chairman of the Genito-urinary Section of the New York Academy of Medicine, myself as president of the New York Society of the American Urological Association, and nine others interested in venereal and sociologic problems.

Later, in Washington, another committee meeting of upwards of sixty was called, comprising men of national reputation in this same and other fields of medicine and sociology, notably the Surgeons General of the United States Public Health Service, Army and Navy, the previously stated four physicians and many others, chiefly professors from medical schools and officers of charitable and sociologic societies. The deliberations presented to the Government are summed up in the interdiction of alcoholic drinking among the troops and venereal disease control under four headings as crystallized later by a Special Venereal Disease Advisory Committee in the office of the Surgeon General of the Army: measures to diminish sexual temptation, education concerning the venereal disease perils; prophylactic measures and curative treatment.

The outcome of these plans are epitomized by the Secretary of War in remarks quoted later in this paper as his estimate of the American

[1] Read in part before the Society of Medical Jurisprudence at the stated meeting, October 13, 1919.

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Expeditionary Force. Hence it follows that early wisdom in a very grave medical question pronounced with authority to the Government was heeded and gave a rich and rare harvest of efficiency and health never before equalled in any other army or navy in this or any other war. This outcome goes far to show that the united opinion of the medical profession concerning questions of public interest is marked by foresight, judgment and wisdom.

Perhaps the best outline for this paper will be a discussion of army and navy medical organization before the war, a presentation of its development during the war in the united services with its accomplishments and last deductions or suggestions for the medical share in universal military training. The writer is among those who believe that such a form of universal military training should be adopted as will forever discourage any and all future attempts at world conquest.

Of the three broad subjects the first is the antebellum army and navy medical organization. One is amazed at the meager personnel efficient in former peace times, exemplified by the following records. Commissions were held by only 447 in the Regular Army with nearly 1,600 in the Medical Officers' Reserve Corps, and by 329 in the Navy, with 25 contract surgeons and with 161 in the Medical Officers' Reserve Corps. The totals of 2,047 for the Army and 551 for the Navy give a United Service total of only 2,562, more or less. These figures approximate 2 per cent of the entire profession in the United States, or even less. Independently of the draft, about 20,000 volunteered very early in the war, manifolding this percentage by 8 and making 16 per cent or more early in the United Service Further augmentation followed, so that when the armistice was declared there were about 35,000 physicians in the Army and 3,000 in the Navy, multiplying the original 2 per cent by 13 and reaching 26 per cent of the American medical profession.

These large figures involve only the uniformed medical officers and carry no recognition of the many thousands of physicians who, as legal and volunteer members of local boards, district boards, medical advisory boards and perhaps the United States Public Health Service, did remarkably valuable service.

The factors in this wonderful patriotism were the authority in the Surgeons General of the Army, Navy and United States Public Health Service; the executive qualities of the Council of National Defense, Medical Section, with its state branches; and finally the close correlation of the County and State Societies of the American Medical Association with its great organ of notice information and instruction, *The Journal*. These societies have for years shown their cohesion in matters scientific, sociologic, economic and, in restricted sense, public. Hence the expected

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thing occurred: consistent response to the nation's call for personal, professional, communal and national service and sacrifice. No one may or will or does question the losses sustained by individuals in absence from home and practice. The devastations of the influenza epidemic were accentuated by decreased medical service in all communities. The whole balance of the draft was to leave the needs of the country in all vocations protected as far as possible. If a draft of the physicians as such had also occurred, the same wisdom would have been exercised. In fact, as later outlined in this paper, it was exercised, especially with regard to medical students and young physicians of draft age.

It is said that a very voluminous card index was prepared for the Surgeon General of the Army by skilled statisticians of life insurance, comprising upwards of 30,000 physicians, and detailing even their knowledge of foreign languages. Such an index should be kept alive and up to date even in time of peace and should contain all members of the American Medical Association. It would be possible to subdivide this roster into three groups: those qualified best for full military duty, those qualified for special or limited military service, and those required by family ties, age and any other limitations for home service. The duties especially adapted for the special and limited military group are outlined later and are of very great importance, judging from experiences in the selective service. By a system of reports to the Government by medical schools on the physical qualifications of each man as he receives his degree, the classification would be easy. In fact the form of report could be on the index card itself and sent at once to the proper bureau of the Surgeon General's office, and a duplicate kept at the schools.

The most pithy summary of the results of medical effort in the World War was given by the Secretary of War on September 3, 1919, in Philadelphia before the Fifty-eighth Annual Convention of the American Chemical Society, in these words: "The soberest, sanest, least criminal aggregation of its size that ever stood together on this planet." This was his tribute to the American Expeditionary Force. He added:

> The doctors, as a class, made a great contribution to the success of the war This is the first war in history in which deaths from disease were less than deaths from battle wounds.
>
> In the Spanish and Russo-Japanese War the disease and death rates were made equal. In this war we have changed that. This was due to the fact that in the medical profession, as in the chemical profession, the leaders of their professions forgot their former activities to put on the uniform and serve the nation.

The second general topic is the development of medical organization and service during the war. There are two phases of this development: the medicolegal in the draft boards and the professional in the training

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and fighting forces for prevention, alleviation and treatment of diseases and wounds.

It should be remembered that as the commonwealth of our country regards the Selective Service Law and its enforcement as a distinctly civilian rather than a military proceeding, so should our profession regard the work of its members on draft boards as civilian rather than military. For this reason, however, no distinction should be made at the cost of those physicians who held no commissions but yet contributed definitely and potently to the creation of the Army and the Navy and the success of the war.

In a brief review of the medical work on local boards by the physicians at home, note must be kept that the doctors held no commissions but only appointments by the President. It will be remembered that nearly every local board had at least one doctor so officially appointed on its personnel, and that he later surrounded himself with several or many volunteers. In some boards of this city these volunteer helpers numbered a dozen or more, subdivided themselves into committees for alternation and reciprocation of service and did work astonishing in amount, detail, efficiency, value and results.

All district boards had a quota of physicians and were by the law required to have at least one. As discussed later in this paper, under the heading of medical appeals, it would have been a direct and expeditious method of deciding questions of physical classifications if the district boards had been by law sufficiently enlarged and composed of an equal number of laymen and medical men. The latter should have been consolidated into a kind of Medical Supreme Court and have finally disposed of appeals on physical grounds. The plan in the selective service by which district boards gave merely a formal hearing and advisory recommendation in physical questions proved to be a futile and fruitless loss of time in most cases.

Later came the medical advisory boards, in large measure founded on the original Advisory Board for Venereal Diseases at St. Mark's Hospital organized by the writer during the first draft from July to December, 1917.

Here again the functions of the Medical Advisory Board should have been those of a Medical Court of Appeal, and the decisions should have been finalities and not *pro forma* recommendations only, as later discussed. If this arrangement were followed, then only in exceptional cases could the Medical Division of the District Board have decisions before it. These relatively few cases would not have overburdened it, and each would have received a new examination or presented new evidence. Both these plans would save almost needless discussions and

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votings in the local boards. This relief of the local boards from difficult cases was very important because many of them were by-words in their neighborhoods, and the finality of independent and disinterested consideration and decision would have avoided disquieting and mean criticism and question, as to favoritism or incompetence. Of very many cases of anonymous and public information against local board medical decisions investigated by me through the draft, very few indeed were proved to be founded on fact. It therefore eventuated that in most instances the local boards were correct in their findings.

When the large number of all these medical members is contemplated, it is realized that practically all the leaders of the profession not under commissions were in the selective service. Conservatively speaking, this is a remarkable record.

Statement of difficulties in the work, if not adverse criticisms, is in order, and it is hoped that in the later discussion of this paper the former members of the Selective Service Headquarters Staff will be heard in agreement or disagreement with what is said.

The spirit of the original local boards was to have one medical, one labor and one legal member. A few boards had all physicians and a few all civilians or lawyers who under the law engaged physicians in an advisory capacity as provided in Sections 38, 42 and 96. The author's opinion is that it was a mistake to permit any board to operate without one medical vote, and doubtless some of the poor work encountered in boards otherwise organized arose from the absence of that vote. Medical men are today as never before, entitled to their full standing and authority in such matters.

Many public-spirited persons hope to see the day when medical questions of importance in our courts of law cannot be decided by votes of lay juries. This is an illustration in common life of exactly the point aimed at in these words.

In New York City the objective was reached of causing volunteer physicians, whether nominated or even appointed by local boards themselves, to be recorded and approved by the Selective Service Headquarters of the state in Albany. The writer was one of the instruments in bringing about this objective. By examination of the medical society and medical institutional affiliations of the nominees the highest possible grade of ethics in the personnel and of efficiency in the work were maintained. It is believed that the results fully rewarded the detail and the labor.

Physicians of draft age almost universally sought and received commissions, before being drafted, acting as volunteers or prior to summons before the Local Board. The strength of the profession of the

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future was protected under the original law and regulations by permitting the enlistment of medical students in the Medical Reserve Corps in accordance with Section 151*b*, Selective Service Regulations. Under the act of May 20, 1918, students who were at that time preparing for the practice of medicine and surgery in recognized medical schools were granted exemption.

These steps were all wise and successful, yet now come three which were otherwise, namely, the Group C or Limited and Special Military Service physicans, the original organization of the medical advisory boards and the variations among standards of medical examination, resident and too long persistent in the orders themselves and in the great differences between board and camp examinations.

Taking each of these three matters in turn, the facts are as follows:

The physicians drafted for limited or special military duty really pestered the Selective Service Headquarters with inquiries about their status as to readiness to enter service in terms of closing offices and homes and severing relations with institutions. They considered themselves in a serious chance predicament, yet could learn or do nothing.

So much difficulty had existed between the headquarters and the boards on one side and the camp surgeons on the other side as to the results of examinations that the thought occurred to me for their induction on the following plan. If these Group C physicians could be inducted into service, given commissions and trained to become permanent examining bodies in the camps under guidance and control of superior officers, then the local and district boards and the Selective Service Headquarters of all states would no longer be dealing with a fluctuating personnel in camps which totally changed as fast as units left for Europe. With approval by the chief of the New York office, the Honorable Martin Conboy, the plan was presented and approved in the Selective Service Headquarters in Albany and then transferred to Washington. Orders of induction followed. The result was unique. They were not given commissions at all until long after induction. The men at least in many camps seem to have been regarded as professional defectives rather than as physical defectives, among licensed and skillful physicians. They were drilled by subaltern lay officers and then given nonmedical duties. One in my knowledge cooked for 200 men for several months, and another carried urinals as a hospital orderly. Yet both these men were successful in private practice in New York City. The point is that few, if any, ever reached the base hospital staff of any camp or the examining staff of any camp according to the plan stated, and commissions were delayed for a very long period. Someone blundered in the interpretation of the plan and in the order for it. Instead of a gain in professional efficiency

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it was a needless and pathetic loss of medical time and skill to the Government. Discontent and resentment ruled among these men almost universally. What is equally important is that all the old difficulty continued as to coördinating examination standards between the boards and the camps.

In a future draft (should war ever again curse this liberty-loving and peace-living nation), a wise provision will place the physicians of draft age disqualified by physical defect from full military service quickly under commission and on duty as permanent parts of base hospital staffs and camp examination boards at home as distinguished from similar bodies at the front.

The second adverse circumstance for our notice was the original organization of the medical advisory boards. The writer recalls an interview with the Provost Marshal General of the Army with which he was honored in Washington in December, 1917. Among other matters casually discussed was that of the forthcoming medical advisory board as it was then planned. The writer mentioned that, according to his experience at his original advisory board at St. Mark's Hospital, only cases of great difficulty should be referred, otherwise the local boards would overwhelm the advisory boards with needless, mere detail work. The restrictions suggested were not accepted for the stated reason that the plan was being developed by a committee of prominent physicians (who certainly had more professional distinction than the writer, but had not had his experience at the hands of the New York local boards). The outcome needs no description. The medical advisory boards did not do the work because they could not. In a certain sense the brief period of this wideopen mistake was the dark period of the draft, in many ways darker than the days of July and August, 1917, when no one really knew his duty or how to perform it. This is true because the local boards felt themselves reflected on and the advisory boards imposed on by the new order. A quasi-deadlock seemed imminent between over-sensitive local boards who would not and advisory boards who could not do the work. The error was, however, very quickly corrected and the restrictions, as described, were placed on local boards so that only true consultation work was referred. Again someone had blundered. A future draft should absolutely guard the judicial, consultant duty of this advisory work. While the class of duty was in this way finally correctly settled, the authority of the medical advisory boards was too little. Much discussion and doubt and fruitless queries of the Headquarters Staff would have been avoided, if, as already stated in this contribution, the decision of the medical advisory boards had been practically final somewhat as, in our courts, the Courts of Appeal overrule the Lower Courts. Cases of

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still greater difficulty could be decided by the district board through its medical staff. Bearing on the medical advisory board development are these peculiar situations. The failure of true recognition of the importance of medical examination and judgment in the classification of the registrants is exemplified by the following facts or fundamental errors in the regulations. They affected the local boards, medical advisory boards, and district boards, and doubtless led to much of the trouble developed through rejections in camps. These three details stand in bold relief against a back-ground of common-sense which should have taught more wisely.

The finding of the local board physician was a recommendation *only*. In the classification on physical grounds his vote had equal weight only with the vote of other members of the board. If he were not a member of the board, he had no vote at all. More peculiar still is this other fact just described. Under Section 123 a registrant could be referred to the medical advisory board, but its findings were advisory only and not determinative, according to Section 122, Note 1, Second Edition. If a registrant, in the third instance, came before the district board on physical grounds, no new examination could be held and no new evidence considered, according to Section 126. It therefore followed that the district board was required to submit and waste its time with a matter of useless form in these cases. At least in this city, the district board usually concurred in the findings of the medical advisory board. Laymen decided medical questions and gave classifications on physical grounds in a measure entirely unreasonable and improper. Doubtless better results would have followed better recognition of physicians' judgment, standing and authority.

The third element of real loss was the changes in regulations and standards of medical examinations. It seems well to note these standards briefly in the order of their appearance. Among the physical examination standards the first to reach the local boards early in the draft of 1917 was Form 11, July 2, 1917, "Regulations Governing Physical Examinations" issued under the authority of the Provost Marshal General of the Army. It contained only four pages of instructions. These first orders seem to have been a hasty abstract of a longer volume on medical recruiting standards in peace. The very abbreviations lead to confusion well exemplified by the author's own experience as to venereal diseases mentioned in a recent paper.[2] Acting on the practice of the Army up to 1916, it was determined to reject all active venereals. This was consistently done until late in December, 1917, when it was learned during a visit to the office of the Surgeon General of the Army, that they were to

[2] "The Venereal Problems of the War," *Med. Rec.*, July 12 and 19, 1919.

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be accepted unless incapacitated or actively infectious. In matters so important there should have been an early and fixed ruling, promulgated at once to all selective service boards. One may say that Form 11 was so condensed as to be conspicuous for what it omitted to make clear. This criticism is borne out by the fact that later more explicit instructions were demanded and published. A booklet was published by the War Department, August 22. It consisted of Memoranda Nos. 3–8, both inclusive, and Circulars 20–23, both inclusive, from the office of the Surgeon General of the Army. It was entitled "Instructions for the Physical Examination of Drafted Men at National Army Cantonments." It is a closely printed pamphlet of thirty-two pages and is clear and definite in its provisions. The need thereof in medical advisory boards was shown by the call for fuller data on physical requirements. The first copy I saw was in Camp Upton. Application was at once made for a supply of them. These were distributed to, used, and appreciated by the medical advisory boards. They fulfilled a long-felt want. In any future draft fuller instructions should be issued at once to all civilian physicians responsible for recruiting. On February 14, 1918, the Secretary of War promulgated Form 64, "Manual of Instructions for Medical Advisory Boards." It was a booklet of 112 pages and went a long way on the road to more stable medical policy in dealing with the registrants. Its defects led to the use by the medical advisory boards of New York City of the said Memoranda and Circulars of the Surgeon General's office at the writer's request. Later, on June 5, 1919, the Secretary of War issued Form 75, "Standards of Physical Examination Governing the Entrance to all Branches of the Armies of the United States for the use of Medical Officers of the Regular Army, National Army, National Guard, Medical Reserve Corp, Recruiting Officers of the United States Army, and of Local Boards and Medical Advisory Boards under the Selective Service." It was a pamphlet of seventy-six pages, and abbreviated and clarified Forms 11 and 64 by bringing all the medical men under one policy and plan. Its errors were very few and its directions were clear. The second edition came out September 27, 1918, about a month and a half before the armistice was signed. It proved its value, however, in the brief period of its application and will doubtless be the groundwork of recruiting in the Army and Navy and the basis of future draft board work. Considered from the standpoint of rapidity of development, all these Medical Selective Service Regulations may be regarded as very creditable and efficient, although critical description of the forms is proper. A peculiar difficulty always enforced itself upon the Headquarters Staff. There always arose divergence between the physicians of local boards with long experience with the regulations, the medical advisory board physicians

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(often with greater professional standing but with little or no knowledge or respect concerning regulations), and the camp surgeons (with almost disregard of the regulations). Special orders of the Surgeon General of the Army, which never or very tardily, if ever, reached the local boards, were often responsible for the last factor named. It is interesting to say that the greater the prominence of a medical advisory board member, the more he disregarded the regulations in many instances, and that the higher the rank of a camp surgeon, the more independent was he of the regulations as given to the boards. Hence a vicious circle existed, very troublesome, indeed, to the local boards, district boards and Selective Service Headquarters Staff. There is no legitimate excuse for this unworkable and obstructive circumstance.

Some method should have been adopted by which any order from the Surgeon General of the Army affecting the examination of registrants in camps should have been transmitted to the Provost Marshal General of the Army for his information and for publication as regulations for the local boards. If this had been consistently done, a vast amount of confusion would have been avoided and at least conformity of method established and needless expense saved to the Government and the registrants through inductions wrongly determined on physical grounds. It must never be forgotten that the Government is little affected by the cost of mistakes on account of its vast resources. The registrants, however, suffered acutely in terms of positions lost, business sacrificed, home relations altered, social ties severed and families scattered. It is all very well to say that, in war, relations of the Government with its citizens are impersonal. The results of the draft are very personal to the registrants, and personal in the highest degree while they are still civilians and not soldiers. Hence twists and folds and irregularities in regulations should be ironed out as much as possible, so as to relieve sacrifice wherever practicable.

If my observation led to one conclusion more than to another it was that the physical examinations and determinations should have been held first. After physical acceptance then the legal status for induction or exemption should have been determined.

A celebrated example of what is meant, concerning confusion of regulations and orders, were the radical changes in regulations concerning heart conditions, proceeding from the office of the Surgeon General of the Army to camp surgeons in May or June, 1918. Up to this time local boards and camp surgeons had been accepting for observation various minor organic and functional cardiac defects in conformity with the experience of the British Army. This experience was to the effect that many of these cases, through training, were reclaimed for first or second

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line duty or valued services at home (each of these three to the extent of about 20 per cent, leaving 40 per cent as final rejections). At this time orders from the Provost Marshal General of the Army were issued to expedite all work so that the largest possible number of men would be trained ready for European duty, but nothing was said in these orders concerning the order from the Surgeon General of the Army to the effect that all such heart cases were to be rejected. The outcome of wholesale rejections in camps of these forms of cardiac disease accepted in good faith by local boards may be imagined.

Regulations concerning the teeth were also most confusing and inaccurate at first. They were changed several times before the fixed standard was published in Form 75.

Variations in rulings as to height for acceptance and rejection threatened at one time to deprive New York City of its full quota, because so many of our foreign-parentage citizens are of low stature. Form 64, Manual of Instructions for Medical Advisory Boards, gave the minimum height as 60 inches. Selective Service Regulations, First Edition, and Form 11, Regulations Governing Physical Examinations, gave 61 inches as the least for acceptance. Selective Service Regulations, Second Edition, referred to Form 75, which published 63 inches as the lowest standard.

When it was pointed out by the Selective Service Headquarters of New York City to the authorities in Washington that several foreign armies contained large numbers of men about 60 inches high the standard was again lowered, and it then became possible to complete the wonderful quota furnished by this city. The fighting qualities of these men became well known and were fully demonstrated.

It is a pity that the Government and the registrants were not protected against such losses in time, energy, efficiency and expenses by such a plan of regular interchange of information between the office of the Surgeon General of the Army and that of the Provost Marshal General of the Army as that just named. Doubtless in another war the record of this experience will be the means of avoiding such a blunder.

Perhaps such criticism from any citizens formerly in the service are not becoming or proper, but these are made with great respect for all offices, officers and their various commands.

Temporary defects and feigned disease or illness were, in the strict wording of the regulations, not managed with the same authority as that specified in Selective Service Regulations, Edition 2, Section 128½, Note 2, for registrants seeking to evade service by self-inflicted injuries. It was provided that after waiver of such physical defect by the Surgeon General of the Army such registrants were to be summarily inducted into service.

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As matters of practice in New York City by concurrence with the local boards and usually by emphatic statement to the registrants, those who feigned illness or defect were often sent into hospitals for observation and determination of defects. Of course most of these registrants went into hospitals to which medical advisory boards were attached, under orders in the more or less strict sense extra-legal but not illegal in character. The result was only good because many men who would otherwise have escaped service were proven to be malingerers and inducted. This experience proves that the following is a workable addition to the regulations of drafts in the future. Local boards and medical advisory boards should have power to order into the hospital as an "observation case" any man suspected of false pretense, and there to subject him to any and all diagnostic tests with his consent. If he refuses such tests there, he should be dealt with as though he were a self-mutilator, and peremptory induction should be given him after a waiver of defect secured of the Surgeon General of the Army, as in Section 128½. If this policy had been operative, much extraordinary work would have been avoided.

Parallel with these statements, a more strict relation between local boards and registrants under treatment as designed by Section 187, "Temporary Defects," would have been very wise. Many boards were neglectful or thoughtless about these cases. As a matter of fact the physicians of the local boards should have been directed to coöperate intimately with the family physicians and institutions in these cases.

The management of a group of registrants, called in the Selective Service Headquarters for a short period "Observation Cases," was instructive and valuable and should be provided for in the regulations of the future. The origin of this classification was, first, the work which for a short time was done in camps on heart disease as previously noted and, second, the large number of registrants complaining of conditions whose degree could only be measured by observation in a hospital.

Through hearty coöperation with camp surgeons, chiefly at Camp Upton, not a small number of men, usually of foreign born parents, were reclaimed for the service by suitable notice by me to the camp officers that they were to be held for more than the usual physical examination and, if necessary, sent to the base hospital accordingly. When the "expedite order" was issued these plans had to be abandoned. It is a manifest fact that camps cannot be burdened with these "study" cases, but equally manifest is the fact that hospitals are patriotically ready to receive and report on these men. Members of medical advisory boards in a future draft would be largely hospital staff men (as they were in tbis draft), and therefore it would be easy to so provide for the final decision

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of these obscure cases. The fact that the Government possessed the right to order self-mutilators and malingerers directly into service (respectively with and without waivers of physical defect from the office of the Surgeon General) at least tends to establish the right of the Government to control these doubtful cases by peremptorily ordering them into hospitals for study, report and decision.

The uncertainties about the Group B or Remediable Group cases were due to inexperience with them, and perhaps doubt as to the best details of securing treatment and reclamation. It was shown to be impracticable, if not impossible, to send these registrants into the base hospitals in camps. This plan was given a brief consideration and found to involve such overcrowding that the care of the morbidity among the men under training in camps would be embarrassed. It was, therefore, proven that the base hospitals could not regularly receive them because their facilities and functions had to be devoted to the men already in training.

In handling these cases in New York City the Headquarters Staff encountered a very large number of "insistants" or "volunteers." By these terms those are meant who willingly underwent operations and other remedies in order to serve their country. They evinced the best spirit of the volunteer, which began with self-sacrifice and suffering for the great cause.

The number was so great and the inquiries from local boards were so numerous as to what to do with them that I made a canvass of all the public and private hospitals of Greater New York City as to willingness, facilities and preparation for these cases. It is a source of great pride to say that no refusals were received and that limitations as to numbers came only from hospitals of small capacity. It was my privilege to operate on not a small number of these patients myself.

My understanding is that the State Headquarters in Albany received equivalent responses to their inquiries of hospitals in the state. To the men themselves I habitually laid down the principle that the longer the convalescent period before arduous physical training in camp began the better the results of the operation. I therefore induced many to submit to operation at once in order to gain this advantage and, furthermore, I recommended to the local boards that, so far as legal and possible, induction be delayed in the spirit of Section 187 governing temporary defects, in order to grant this advantage. From the patriotic attitude of the registrants and the generous service by the hospitals the following judgment, founded on this pleasant experience, seems permissible. Group B registrants in communities having hospital facilities should be ordered into the hospitals for correction of the defects as soon as the diagnosis is

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settled, then cured and thereafter given a long convalescent period before induction. Only fair play and good will to the registrants are exemplified in this suggestion such as the Government endeavored to show and did in fact show to the drafted citizens.

Regulations for a future draft could readily provide a system of distribution among the hospitals. A method of application and of admission to the hospitals in the order of application would be easy to formulate so that no hospital could be overburdened.

Nearly every railroad town at the present time has one or several good hospitals. From this fact it seems probable that the early reclamation of Group B—the Remediable Group—registrants would be easy and feasible. It is conceivable that in another world war, such as the next war will surely be, this policy of early reclamation of remediable defects will be imperative and may become a great deciding factor.

Until final reports from the Surgeons General of the Army, Navy and Public Health Service and from the Provost Marshal General of the Army are in hand and digested, temporary deductions as to the outcome of the draft are alone possible, but it is desirable to state that these are commendatory and creditable. About ten million men were called and registered, but only a third of these were examined. Of this third, 29.6 per cent were disqualified and 70.4 per cent accepted and then sent to camps for training. At the camps 8.1 per cent were rejected and 91.9 per cent finally inducted. A very instructive comparison of figures reveals these data: In the draft of 1917 rejections numbered 29.1 per cent; in 1918, 29.6 per cent; in the Civil War first draft 31.69 per cent, second draft 24.06 per cent, third draft 24.95 per cent, and in the fourth draft 13.42 per cent, making the average 25.74 per cent. Relaxed standards of examination marked all but the first Civil War draft. In this World War, urban rejections were 21.68 per cent and rural rejections 16.89 per cent among 100,000 of each class considered. All these figures prove the consistent good work and good faith of the physicians in the midst of what seemed at first to be almost hopeless confusion, disorganization and unpreparedness. The outcome was a triumph of Anglo-Saxon individualism and of American genius of fearless enterprise and production.

Under the present topic of the development of medical organization during the war come, as stated, professional accomplishments among the training and fighting forces, in prevention, alleviation and treatment of disease and wounds. The clash and crash of arms are no longer the only victory of war. The conquest and triumph of preventive medicine have never been so signal, nor indeed so actual. The Secretary of War, as quoted, states that this World War is alone in history with battle fatalities outnumbering disease mortalities.

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The probable factors of these successes are two: actual scientific progress in determination of causes, transmission and prevention of disease and actual recognition of the authority of medical officers to determine matters within their own sphere with relation to the forces. Based on the experience of this war, the prophecy is becoming and fitting that in the next war the official standing and authority of medical officers will be greater than in this one. Of course only good will result therefrom.

Limitation of space forbids lengthy quotations from the history of military medicine, but one may state that in this World War vanquished and vanished were the specters of devastated communities and decimated or destroyed armies by such familiar war time diseases as typhoid, typhus and relapsing fever, scurvy, malaria, smallpox, tetanus dysentery, meningitis and the like.

Sanitation and vaccination came, saw and conquered typhoid fever even in the real epidemic in 1914 in Belgium. Compulsory vaccination permitted only six deaths of smallpox among more than two million American enlisted soldiers. This recalls the classic fact that in the Franco-Prussian War, the French, without compulsory vaccination, had far more deaths from smallpox than the Germans, with compulsory vaccination, had cases of this disease. Antivaccinationists, antivivisectionists, Christian Scientists and similar other "cultists" take notice.

Each of the other diseases listed had a more or less epidemic start, intense struggle and total conquest by sanitation and preventive medicine. Typhus fever in Servia, Austria and Russia is a by-word. The work of the American Red Cross in Servia can never be suitably memorialized. The statement is made that there is hardly a family in that country that has not suffered, directly or indirectly, in its close or remote relationships, or in its casual and intimate friendships. This is the measure of what typhus fever in Servia meant. Relapsing fever appeared in Russia, and cholera in Italy and Russia. Scurvy is almost unknown through suitably canned green vegetables and good food. In prison camps where food was withheld, it came but was soon relieved. It also appeared in Mesopotamia through excess of dried vegetables. It is no exaggeration to say that in the days of Sir Francis Drake scurvy was the dread and a great problem of the British Navy. Tetanus through antitetanic serum and prompt antiseptic measures is almost completely eradicated from wounds. The easy application of sanitation when knowledge is complete is shown by the facts that trench fever is now prevented from its limitation of fighting efficiency by the destruction of body lice as the carriers. The bedbug and the body louse are known to carry and transfer both typhus fever and relapsing fever. Does it not seem foolish that the work of the Medical and Sanitary Corps should be limited by any author-

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ity outside its own heads except in the sense that they are part of one coördinate machine? A very brief epitome shows that by preventive and protective inoculation dysentery, typhoid fever, cholera and smallpox were greatly controlled and that, by destruction of vermin typhus fever, recurrent fever and trench fever were also checked. In all these and similar diseases, sanitation is of great importance, as proved by its influence upon malaria and yellow fever through the destruction and exclusion of the mosquito, and in other conditions by the exclusion and destruction of the common house fly.

Still open for progress and largely not controlled in this war were mumps, scarlatina, measles, pneumonia and meningitis. Partial failure in this war does not foretell continued failure in civil or military conditions of the future. Typhoid fever fatalities were about one-tenth those of meningitis and about one two-hundredth those of pneumonia. No extended epidemic of any disease occurred, except the worldwide epidemic of influenza with pneumonia secondary to the influenza. If its peculiar and ravaging devastation is deducted, then the morbidity of the entire American Army sinks to the amazing total of 2.2 per thousand. This is hardly more than the sickness rate in times of peace.

When the authority of the Medical Staff is heeded by the General Staff of our Army and all overcrowding in barracks avoided, then this step in sanitation will aid in decreasing the incidence of such respiratory diseases as those already mentioned: pneumonia, influenza, measles and meningitis.

A remarkable and concrete example of the influence of overcrowding occurred in one of our largest hotels and the principle and results apply to barracks also. The laundry for guests' property was taken from the subcellar to the roof and housed in a modern factory structure with extraordinary window space for sunlight and air on all four sides. The proprietor has reported to the writer that the subconscious efficiency and the general health of the workers have improved at least 50 per cent. The reply was that after a while the average business man would develop brains enough to realize that, when a physician speaks, he usually speaks the truth to the effect that good work cannot be obtained from any animal in unsanitary conditions, no matter whether such animal is a human being with a soul in a laundry or a horse without a soul in a stable. We will hail the day when the efficiency engineer walks side by side with the sanitary engineer, the one laying out the factory building and its equipment for mere work, and the other laying it out for the basis of all work, namely, the health of the workers. Verily, civilization has still much progress ahead of it in these matters. Unsanitary crowding in camps and barracks brings its own dangers of disease.

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The last general topic is deductions or suggestions as to the medical share in universal military training. Medical education and medical standing in the army organization and the nation seem to be the subdivisions of this subject.

In the matter of education, every medical school in the country, along with its developments toward the highest possible grade of training, should in the future include a brief course of lectures by a suitable army or navy medical officer on the broad principles of the organization and duties of the Medical Staff and of the plan of medical stations and hospitals at the front. To this may well be added clinics concerned with the broad principles of examining, accepting or rejecting recruits. Army and navy sanitation should be duly emphasized. In my own day as a student not one of these topics was taught or even alluded to except perhaps some phases of military surgery. Even these were noted as parentheses and were not made plain, declarative sentences of scientific duty for each student. The writer even doubts that this much would have been taught but for the fact that Dr. Robert F. Weir, one of the professors, had been a prominent surgeon in the Northern Army during the Civil War and therefore knew the importance of these topics. It is folly to expect to lead the profession blindfolded into such a sphere of work as military surgery and sanitation when moderate illumination will be so instructive. Medical students should be taken to camp and made to play the part of the Medical Corps enlisted men during the camp training of the members of the Medical Officers' Reserve Corps.

In the matter of medical standing in the army organization and the nation, the following facts seem proper. Whereas nearly all small and many large urban communities have either a health officer or health department as an integral part of their government, it is anomalous that no nation has a central health portfolio equal in rank and influence with other branches of the Government. The United States should have a Secretary of Public Health in the Cabinet.

The United States Public Health Service is subordinate to and only a bureau of the Department of the Treasury. It cannot have its own budget except within that of the Treasury Department. It cannot appear before Congress except through commission or permission of the Secretary of the Treasury. Again it is a case of decision and judgment by a layman as to whether or not a medical problem is worth consideration and whether or not it shall be accepted or denied. Only the other day the writer asked one of his patients who is a member of the New York Chamber of Commerce why that body did not elect a few prominent physicians so that first hand it could be kept in touch with the nature and importance of questions of public health. His frank admission was that

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the probable reason is, no one had ever before presented this question. He further admitted its manifest importance.

In the Navy rather recently the Medical Department has become a part of the General Staff, but in the Army the Surgeon General is not a member of the General Staff or even represented thereon. During the war General Pershing, of his own initiative, placed three medical officers on his General Staff. If the medical problems of the fighting forces are to be correctly solved, then they must be left in the hands of medical men commissioned in proper rank and vested with full authority for such solution, subject to military necessities only.

The success with which the plan of General Pershing resulted will probably be the forerunner of the very recognition described. The present anomalous situation probably arose from the fact that sanitation and protective medicine are only now greatly developed and still developing departments of medicine. In most of the former wars and even in those of recent date, except the Russo-Japanese and the Spanish American War, they were almost unknown. The accomplishments of these two wars were as little or nothing when compared with the results in this World War. Insistent but patient should be the demand, however, that henceforth a greater standing must be given in military forces to medical science. When its results are fully measured, then the present errors will be corrected. As a rule it takes a generation for such reforms to establish themselves. For instance, this generation accepts the bacterial origin of many diseases as axiomatic, but the last generation at first heard, then doubted, and finally accepted the fact.

There is nothing in this contribution in the slightest degree unappreciative, unpatriotic or unfair in its aim. It is impossible to close the paper with an approbation of the Selective Service Law and the medical work in the war in words better than those of my former chief, the Provost Marshal General of the Army, which rather aptly apply to both:

> By all administrative tokens, the accomplishment of their task was magic, but the magic lay solely in this:
>
> At the President's call, all ranks of the nation reluctantly entering the war, nevertheless instantly responded to the first call of the nation with a vigorous and unselfish cooperation that submerged all individual interests in a single endeavor toward the consummation of the national task. I take it that no great national project was ever attempted with so complete a reliance on the cooperation of citizens for its execution. Certainly no such burdensome and sacrificial statute has ever before been executed without a great hierarchy of officials. This law has been administered by civilians whose official relation lies only in the necessary powers with which they are vested by the President's designation of them to perform the duties that are laid upon them. They have accomplished the task. They have made some mistakes. The system offers room for improvement. But the great thing

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they were called upon to do they have done. The vaunted efficiency of absolutism of which the German Empire stands as the avatar can offer nothing to compare with it. It remains the ultimate test and proof of the intrinsic political idea upon which American institutions of democracy and local self-government are based.

If this brief contribution stimulates the discussion of the points it has raised, the great labor and detail of its preparation will be fittingly recompensed. If time brings and augments the changes it merely outlines, then its production will have been fully justified.

ANNUAL MEETING OF THE ASSOCIATION WILL BE HELD IN NEW ORLEANS, APRIL 22d, 23 and 24. MEETING OF THE A. M. A. BEGINS APRIL 26. BEAR THIS IN MIND.

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CAMP PONTANEZEN, BREST, FRANCE[1]

THE great embarkation camp at Pontanezen handled such a tremendous number of men and was the subject of so much criticism in the United States that it requires a more lengthy and detailed account than does any other camp. The following marrative is condensed from the complete and excellent history of the camp by Col. M. C. Stayer and Lieut. G. R. Cowgill, of the Medical Corps, with the addition of some statements by Col. L. L. Smith, M. C.

That at the beginning the condition of the camp was bad cannot be denied. The conditions in December, 1918, when the camp was suddenly ordered to be converted into a great embarkation camp, were partially described by the camp surgeon at the time:

> Men were working in mud and rain most of the time and it was extremely difficult to find fuel for fires, and practically impossible for the men to use tents for shelter because the ground is practically never dry. The water supply is constantly receiving the washings from the fields fertilized with human feces and, in consequence, all the water must be treated before being drunk. Every field fertilized in this way furnishes an ideal breeding place for flies, and conditions necessitate elaborate apparatus for the sanitary protection of troops, very little of which was available,

and much more to the same effect. But the place had to be used, and it *was* used, unfortunately, before it could be made ready.

Brest was the only port on the west coast of France having a good, deep-water harbor for the great transport ships which moved the bulk of troops to and from France. It was the principal debarkation port in France when the tide of men (and of supplies as well) was at its full flow. Of the 1,057,000 men landing directly at French ports, 791,000 landed at Brest. It was inevitable that, when the ebb came, vast numbers would pour into the place and make it the greatest embarkation station for the home ports. Nearly a million men left Brest in the first half of 1919.

For this tide of men an embarkation camp was ordered, known as Camp Pontanezen. This was not a new camp. It had been examined by a board in the spring of 1918 and found fairly satisfactory, provided certain improvements were made, for some 10,000 men. It was somewhat improved, but during the summer and fall of 1918 the small permanent garrison was straining every nerve to keep the tide of men and supplies moving towards the front. There was little time to spend in preparing for debarkation, which then seemed far in the future.

[1] From reports by Cols. Guy L. Edie, M. C.; M. C. Stayer, M. C.; L. L. Smith, M. C.; and 1st Lieut. G. R. Cowgill, M. C., U. S. A. Made to Historical Division, Surgeon General's Office War Dept.

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Until the very day of the armistice no time could be given to preparation for moving men in another direction. Nor were there the difficulties that appeared later, for the troops debarking did not remain long at Brest. Many went directly to the trains; others waited for only a day or two.

Troops began to arrive for embarkation about the middle of December, 1918, only a few weeks after the selection of the camp. On December 22 but 44 per cent of the tents were floored; in the remainder the men had to sleep on the ground. Forty thousand men were embarked in December, 65,000 in January (1919), and 110,000 in February.

The climate was, to say the least, disagreeable. Rains in October and November increased and became almost continuous in December. In January, 1919, there were some intervals, and dry periods in February. As Brest is on the Brittany peninsula it has an actual insular climate. The treeless plateau of the camp site was swept by moist or rain-laden winds from the Atlantic. Rain fell almost every day of December, 1918, and on three out of four days in the next month. There was, however, but one fall of snow, and little or no freezing weather.

Site and Buildings.—The site of the camp consisted of an inside area, covering approximately 15 acres, and an outside area which was increased gradually from about 90 acres in the early days to approximately 1,000 acres when the camp reached its maximum capacity in the spring of 1919. The inside area was within a wall and contained the old and very large stone barracks, about six in number, and several smaller buildings. This area was known as Pontanezen Barracks and had long been used by the French as a military garrison. It also included a stone building known as Napoleon's Morgue. The outside area consisted of farm land surrounding the inside area, and was gradually increased by requisitioning the land from the French as it was needed for the increasing number of troops.

The dimensions of the camp, as finally completed, were approximately 1 mile wide by 1½ miles long. It lay on a hill, sloping towards the south, about 1½ miles from the harbor. While the slope afforded drainage, there were neither good roads, walks, sewers nor drainage ditches, and the clayey loan surface was cut up into small rectangles by dykes and hedges. The water supply was from springs about 2 kilometers to the northeast.

In spite of all that has been said, the site was a fairly good one, or could have been made a good one, and it was the only one available near the city. It has to be used.

Besides the old stone barracks already referred to, there were, in early November, 1918, a number of new steel barracks which had been

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completed. There were sufficient pyramidal tents to accommodate 5,000 troops. In 1918 many of the men also occupied shelter-tents. At first there were no floors. By December, 1918, there were a few. Some had duck-boards and some had half-floors. In January and February, 1919, the number gradually increased, and by April or May all tents were completely floored. In the early days there were no stoves for barracks except a few of French make; later, stoves were provided for all barracks and tents.

The camp as a whole had a capacity of 67,000 transients and 15,000 permanent troops, and at times this was completely filled. Yet, as a rule, the whole camp was not crowded. Some organizations remained but two or three days, others as long as a month. The average wait was about three weeks in the winter, a week or ten days in April. By that time there were 450 barracks (110 men each) and 5,000 floored tents, each sheltering six men.

There were at first only two roads, north and south. Two east and west roads were built, and in the spring of 1918 a number of good roads were completed. In the early days there were no walks. In January and February, 1919, a large number of "duck-board" walks were laid, and by spring good walks were laid all over the camp, which was lighted by electricity.

Additional water supply was secured by impounding from an open stream and boring wells. The total supply then amounted to 275,000 gallons daily. This was little more than 5 gallons per capita daily when the camp was filled to capacity. The water was chlorinated and examined frequently. In the spring, when the camp was completed, there was an adequate water supply; but in the early days there was neither water supply nor other facilities for bathing, or even for hand-washing.

Medical Administration.—On December 1, 1918, Col. B. H. Dutcher, M. C., was assigned to duty as camp surgeon, there having been no medical organization previously except that of Camp Hospital No. 33. The medical personnel then amounted to 104 officers and 400 enlisted men. By February, 1919, the personnel had amounted to 134 officers and 875 men, and by April to 230 officers and 1,561 men. From then it declined rapidly.

Colonel Dutcher was relieved on February 4, 1919, by Lieut. Col. R. H. Wilds, and on March 4 the latter was relieved by Col. M. C. Stayer M. C.

The activities of the Chief Surgeon's Office were varied. Offices of administration, records, statistics, sanitation and medical clearance were maintained. Numerous infirmaries were established. The camp

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hospital and segregation camp were coördinated under the camp surgeon and friction reduced to a minimum. Weekly conferences of medical officers were held and health and venereal bulletins issued to keep commanding and medical officers acquainted with prevailing conditions of sanitation and health.

Although most organizations passing through the camp had medical detachments, some did not, and it was necessary to maintain six infirmaries for those unprovided units, besides the seven maintained for permanent organizations.

Hospitalization.—The sick at Pontanezen were cared for at Camp Hospital No. 33, which had a capacity of 2,800 beds and an isolation section for contagious diseases. Navy Base Hospital No. 1, Camp Hospital No. 45 at Landernau, and the Kerhuon Hospital were also available. During the influenza-pneumonia epidemic of October and at times after the armistice the hospital facilities were taxed to their utmost capacity, but the sick and wounded were always provided for. There was no justifiable criticism as to the handling of sick and wounded at Brest.

Camp Hospital No. 33 was actually a general hospital, occupying thirteen adrian barracks and four 300-foot barracks, with some of the old French barracks for overflow. In April, 1919, the hospital had 1,000 beds and an emergency capacity of 1,200. It was then still further expanded and soon reached a maximum capacity of 2,600 beds. The personnel was improvised, and no nurses arrived until April, 1918. The personnel was always insufficient, and especially so in the fall of 1918, when the great epidemic broke out and 12,465 patients were admitted.

The Segregation Camp.—This camp was maintained for the isolation of contacts of infectious diseases. It was established December 6, 1918, at the extreme northern extremity of the camp, in a triangular area and bounded by three public roads, which simplified the matter of guarding. The usual disease contacts were isolated here: pneumonia, measles, scarlatina, diphtheria, etc. Venereals were not all isolated in this camp until June, 1919. It was termed a quarantine camp until February 13, 1918, when the more euphonious designation "segregation camp" was adopted. The men were quarantined in floored tents, with no more than six men to a tent.

The camp was divided into plots, to each of which were assigned certain men, as venereals, diphtheria contacts, etc. Negro venereals were separated from the whites; venereal suspects were also separated from those with definite diagnoses. Venereals were classified as A, B, and C. Class A were unable to do any duty, and received no pay. Class B performed light duty, and Class C full duty (or labor). Both received pay. All were tried by court-martial, in accordance with a general order

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of the A. E. F. A segregation camp hospital was maintained, with 200 beds and a sufficient laboratory. Scabies was treated in a specially equipped building. No stockade was provided for venereal or any patients except general prisoners.

The capacity of the segregation camp was about 1,500 until June, 1919, when all venereals were ordered to this camp. Early in July, 1919, all the venereals from the Army of Occupation were received, as well as others from various ports of France, necessitating extensive additions to the camp. All patients were organized into battalions, of which there were six in July, forming a provisional regiment. Extensive buildings for treatment were provided, with facilities for treating 4,000 cases of gonorrhea and 2,000 ulcers in one and one-half hours. At this time the camp was largely a venereal camp. The number of cases of venereal disease segregated numbered about 1,200, and of all contacts about 200.

This camp had a canteen and a Y. M. C. A. hut (with capacity of 2,000). Educational classes were maintained, instruction in hygiene, citizenship and other lines given, and a general friendly attitude maintained. This attitude was reciprocated, and a good morale was shown to be possible among the unpromising material which an aggregation of venereal patients furnishes.

Sanitary Management.—For purposes of sanitary inspection and control the camp was divided into seventeen sections. Each section had a sanitary inspector. The camp sanitary inspector had three chief assistants, two (white) sanitary squads, and 265 negroes from a labor battalion. Three negroes were assigned to each kitchen, and six to every five latrines. The sanitary squad supervised the work of the negroes. Senior surgeons of organizations were held responsible for sanitation in their own areas. Every day the sanitary officer held a meeting of his assistants, and the camp surgeon held a weekly meeting for all senior surgeons and sanitary inspectors.

The camp sanitary inspector had two sanitary squads (white) of 26 men each and 265 colored laborers. Two white men and a sufficient number of negroes were assigned to each area. Those on duty at the kitchens were required to keep the garbage cans and surroundings clean; those at the latrines washed the seats daily and sprayed the interiors twice daily with cresol and crude oil.

Certain activities required special inspectors. One officer inspected troop kitchens; one had entire charge of drainage problems; another handled latrine construction. Both of the latter worked with the Engineer Department.

Kitchens and Mess Halls.—When the 8th Division took over the operation of Section 5 on December 1, 1918, there was but one kitchen

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in the camp. This was operated in an old stone building known as "the Morgue" within the walls of the caserne. It had seven double field ranges and forty-one French cauldrons, but no mess hall. This kitchen fed about 7,000 men daily and operated day and night until April, 1919. About the middle of December this kitchen fed 17,200 individuals in twenty-four hours. A mess hall was soon built, accommodating about 400 men. The great majority ate in the open, although there was almost incessant rain all the time.

As the great camp was built seven kitchens were extemporized, with field equipment. Later these were equipped and became permanent kitchens. Each kitchen had a personnel of one officer, two sergeants and fourteen privates. Cooks, kitchen police, etc., were drawn from the units served. As the work was continuous, day and night, mess officers were relieved weekly. The buildings were long and low, with dirt floors, usually ankle deep in mud. Each was divided into five separate kitchens, each equipped with two double field ranges and a number of cauldrons for coffee, stews, etc. The food at that time consisted chiefly of bread, beans, coffee and stew (or slum). These kitchens fed from 4,000 to 7,000 men each. Such large kitchens were more economical and easier to manage but did not allow much refinement of menus.

At the end of December, 1918, but three kitchens had mess halls. These had high, wooden tables and dirt (mud) floors, which emitted a putrid odor from the trampling in and decomposition of food particles. The difficulties and disagreeable features of these early kitchens could not be exaggerated.

Meanwhile seven model kitchens were under construction. The entire camp was divided into areas, each with a model or "troop kitchen." Each could feed 5,000 men in forty minutes. Eventually there were sixteen of these kitchens. Each was approximately 375 feet long and had six completely equipped unit kitchens. These kitchens were provided with all necessary modern appliances and had concrete floors. The mess halls were about 300 feet long. By a system of inspections and markings a friendly competition was brought about between the personnel of all kitchens, and special merit was rewarded by leave.

Ultimately all kitchens had water supply and sewer connections. Vegetable bins, made of wire matting and set above the floor, were devised. A special meat-room was built in each kitchen. Incinerators of the McCall type were built, with pipes furnishing hot water. Cleanliness of the personnel was especially looked after.

To feed 5,000 men, even at a six-fold kitchen, required fine organization. Each organization was marched by its mess officer to the mess-hall at the exact minute designated by the kitchen officer. At a small

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office the organization officer signed a mess-book, stating the number of men present and the number to be fed at some other time. As the men filed past they were counted and the figures checked. The men then passed along the runways (between the individual kitchens) and received their food in their mess-kits as they passed the serving counters. They then passed into the mess-hall. After eating, they passed along a boardwalk to one end of the kitchen where twenty French cauldrons were filled with hot soapsuds and boiling water. Here they washed their mess-kits, first in hot soapsuds and then in boiling water. Garbage cans were located along the route from the mess-hall to the washroom. Their mess-kits washed, the men then passed along another walk to the exits. These kitchens appear worthy of so extended a description; they were, in April and May, 1919, satisfactory from every standpoint.

Field officers were quartered in Red Cross buildings and had special menus. Officers below this grade were quartered in barracks and tents and had their meals at the general messes. Sales commissaries and exchanges were scattered about the camp.

Disposal of Wastes.—A number of old French latrines of the hopper type, with cesspools, were in use in the inside area. Other latrines were supplied, with galvanized cans, in the early days. In October, November and December, 1918, about twenty-five cement-lined pit latrines, with urinals, were constructed and their contents removed by odorless excavator. Later, in January, February and March, 1919, these were supplemented by a large number of pit latrines of the box latrine type. The contents of the latrines of the can type and of the cement vault type were hauled away and buried in two deep pits, or trenches, at the edge of the camp. These pits were burned out with crude oil and the contents covered with dirt. By April this system was abandoned.

From November, 1918, to July 1, 1919, there were practically no flies at Camp Pontanezen.

There were very few animals at Pontanezen, motor trucks being used instead of horse-drawn. The small amount of manure which it was necessary to dispose of was hauled away by the French or buried in the pit latrines with feces.

Garbage and waste in general was at first hauled away in wagons by a central police force. When the barrack and tent areas were complete and incinerators in operation this work was comparatively less. Trucks and fourteen tank wagons were available in the course of time, so that it was possible to clean the entire camp twice daily. By June sixteen trucks were available, and the number of wagons was reduced from seventy to fifteen. Prisoners of war were then used for much of

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the work. Each truck had a certain route, five being used for trash and salvage and the others for garbage. Additional trucks could be supplied for any sudden influx of troops.

The disposal of garbage was always a problem. In 1918 there was not the vast amount that collected later when 5,000 men were fed at each of sixteen kitchens. However, but little fresh meats or fresh vegetables were used. At first, part of the garbage was taken by French civilians, but for sanitary reasons this had to be discontinued. Garbage was then buried in great pits. As the troops kitchens were completed and a better balanced ration furnished, the amount of waste increased to sixty to eighty large cans per day in each kitchen. During March, April and May, 1919, incinerators were constructed at the kitchens, each capable of disposing of all the garbage, then averaging more than forty-five cans. Garbage cans, at first lacking, were gradually received and concrete garbage stands built for them.

Health Conditions.—From January, 1918, to December 1, 1918, Camp Pontanezen functioned as a debarkation and rest camp. Its garrison was small and health conditions have been described. From December 1, 1918, it functioned as an embarkation camp of a size and rapidity of movement hitherto unknown in American military history. While the strength in December, 1918, was but 7,000, in May, 1919, it rose to 69,407. The number of men passing through the camp—40,000 in December, 1918—rose to as high a figure as 170,000 in July, 1919. The permanent strength of the camp rose to about 15,000. The early sanitary conditions and faults have been discussed.

Unfortunately, statistics for December, 1918, are not complete. Mortality rates during the first six months of 1919 varied from 14.9 in January to 2.1 in June, and averaged 7.4 per thousand. With this month there was a steady decline.

Death rate, permanent troops.....	6.8 per 1,000 per annum.
Death rate, transient troops.....	7.6 per 1,000 per annum.
Death rate, whole.....	7.4 per 1,000 per annum.

The death rate for the whole army during this time was estimated at 9.1. It seems peculiar that there were more sick among the permanent troops, but more of the transients died.

Of communicable diseases, mumps, influenza and pneumonia were most important. The morbidity rate for mumps, by months, was: 120.3, 48.9, 48.9, 25.3, 24.4 and 16.7.

There was a mild recurrence of influenza-pneumonia in January and February, 1919. An annual rate of 106.1 per 1,000 was recorded in January, and 108 in February. The disease had persisted since the recent epidemic. The amount of pneumonia varied about 50 per 1,000

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in January and February to about 2 per 1,000 in June. The average admission rate was 22.9, and for permanent troops 32. This rate will compare favorably with those of some of the camps in the United States during the same months, but not with others.

Meningitis appeared only as sporadic cases. From three to five cases were seen in each month, with a maximum of ten in May, 1919. In the whole six months there were but thirty cases, of which twenty-one were in transient troops.

Though always present, measles was not an important disease. The largest number of cases seen in one month was thirty-seven in April. There were no fatal cases.

Diphtheria showed twenty-seven cases, and there were eight each of scarlet fever and chickenpox, and two of typhoid. The vast majority of the men had passed through these diseases prevous to enlistment or in the camps in the United States.

Preparation for Embarkation.—As the principal function of Camp Pontanezen was the preparation of troops for embarkation, and as three-quarters of a million men passed through "the mill," its plan and method of working are deserving of study.

The basic idea was a division of the entire camp into areas, which might be likened to rooms in a hotel, receiving not one man but an entire organization. Within its own area each unit had its kitchen, infirmary, prophylactic station and welfare hut. A segregation camp was provided for venereal cases and "contacts." All sick and suspects and men with fever were sent to the camp hospital. Sterilizing and disinfecting plants were provided for getting rid of vermin. The plan was not to pass men from zone to zone but to hold them in one area, isolating only the sick and "contacts."

Organizations arrived at all hours of the day and night. After detrainment the men were immediately supplied with a hot meal. Data as to the strength of the arriving organization were telephoned to the billeting officer, and tents assigned before troops reached their designated area. Preparation for embarkation was the important work then to be done.

The process of preparing an organization for embarkation may be described best by following a unit from its arrival in the camp to the time when its men climb the gangplank of the homeward bound steamer.

On arriving at the camp, the organization, as has already been stated, was assigned to a certain area, where a kitchen, infirmary, water supply, latrines, sewer connections, etc., were already prepared (in the latter? of the camp.) Commanding officers and medical officers reported at the main billeting office for instructions. Instructions for medical officers covered:

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1. Reports required.
2. Disposition of sick and contacts.
3. Physical examinations required.
4. Infirmaries, ambulances and prophylactic stations.
5. Medical supplies and dental treatment.
6. General orders and memoranda of medical interest.

Within twenty-four hours after arrival the transient organizations received orders to report for physical examination at a specified time. These orders were so issued as to call for 240 men every ten minutes. The unit reported at a large central building arranged for examination and bathing. This building had numbered seats (benches) for 480 men. The men stripped to their undershirts and stood on the benches, two rows facing each other. The medical inspector then passed between each two rows, looking for venereal disease and vermin. This arrangement of the men made it unnecessary for the inspector to stoop. The men then stepped down from the benches and pulled their undershirts over their heads, and the inspector passed along a second time, looking for skin diseases, scabies and body lice. Men found to be diseased or infested with vermin were segregated in a special room. The others placed their underwear and socks in bins for sterilization, leaving their outer clothing on the numbered seats. At a given signal 120 men went to the shower bath-room, where they received a four-minute hot bath. Each was then given a clean towel, socks and underwear and returned to the numbered seats. They dressed quickly and passed out. But one minute was allowed for a change of groups in the bath-rooms, so that a continuous stream of bathers was kept going at the rate of 120 men every five minutes, or 1,440 per hour. Orderlies were in charge to prevent talking and to maintain order. Lists of all men cleared were sent daily to the medical clearance officer.

Men found to have crab or body lice or nits were sent with an officer of the organization to their quarters to procure their blankets and other clothing, and then to a delousing plant. There they undressed completely and placed their clothing in receptacles for sterilizing, passing to a room where the axillary and pubic regions were closely clipped and treated with vinegar. They then passed to a bathroom, where they rubbed the entire body with kerosene soap (1 pint of kerosene to 5 pounds of soap dissolved in hot water), following this with a hot shower. While this process was going on, the men's clothing, except leather and rubber articles, was sterilized by steam for a period of twenty minutes. On coming out of the bath they were given clean underwear and clean socks and their own clothing returned to them. The medical officer in charge then checked the list of men and receipted it by writing "deloused," with date

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and signature. This list was then forwarded to the medical clearance officer.

Men found to be lousy were sent to the delousing plant and treated as detailed above. Men found with scabies or venereal disease were sent to the segregation camp for treatment.

Before an organization could embark it was required to have a clearance certificate covering all officers and men. A medical clearance officer received all lists of clearance from the examining and bathing building, from the delousing plant and from the segregation camp. The certificates of examination of an organization, certificates of examination of its officers, and lists of men found with vermin, scabies or venereal disease were clipped together and marked "uncleared." When the report of the delousing plant was received it was added, as was also the report of admission of scabies and venereal patients, to the segregation camp. When all lists were checked and balanced, all men found to have been examined, all the lousy disinfected and all scabies and venereals sent to the segregation camp, the papers were signed by the chief epidemiologist, and that organization was "*cleared.*" Clearance certificates were then sent to the troops movement office and base surgeon, one filed and one furnished to the organization, which then received sailing orders. If the organization did not sail within six days it had to be reexamined. Each officer was required to have a separate certificate, while the clearance for the organization covered all enlisted men in it.

The last certificate required was one showing that each man's throat had been examined daily and his temperature taken within twenty-four hours of sailing. This was made as a blank form. Any unfortunate having a temperature of one degree above normal was sent to hospital. Any with suspicious throats were sent to the segregation camp.

Sick or suspects sent to hospital, if they became of duty status in time, were returned to their organizations; if not until after the organization had sailed, they were transferred to a casual company, which embarked as a unit. Those patients who were to be embarked as "sick" or "injured" were transferred to an embarkation hospital and handled by its organization. Contacts handled by the segregation camp were treated as ordinary sick.

The camp surgeon received, as was absolutely necessary, three Troop Lists daily:

1. Billeting office, giving organization, strength and location and date of arrival. Changes on location were also reported.

2. Personnel office: strength, for statistical purposes.

3. Camp headquarters: list of transient troops; preparing for inspection, ready for inspection and ready for embarkation.

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VENEREAL DISEASES FOUND IN OFFICERS AND MEN FOR EMBARKATION

	Examined	*Found*	*Rate per* 1,000
March, 1919	139,237	167	1.19
April, 1919	200,031	154	0.76
May, 1919	213,247	242	1.13
June, 1919	248,858	264	1.06
July, 1919	214,075	572	2.67

In every month the rate per thousand for officers examined was higher than that for enlisted men:

	Rate for enlisted men	*Rate for officers*
March	1.18	1.53
April	.71	1.79
May	1.04	3.10
June	1.02	1.95
July	2.64	3.33
Average	1.32	2.34

Many other details of this process are to be found in the Medical History of the Camp, but space for them is not available. A study of the whole system should be valuable to any officer required to inaugurate and conduct such a camp.

Auxiliary Agencies.—The entertainment facilities of the camp were the following: Y. M. C. A., auditorium, capacity, 3,000; Y. M. C. A., recreation centers, six; K. of C., recreation centers, one; Jewish Welfare Board, recreation centers, six; Salvation Army, recreation center, one; American Red Cross, recreation centers, four.

Entertainments of some kind were given every night, such as moving pictures, vaudeville, boxing exhibitions, etc. The total capacity of the buildings was about 25,000.

Early Faults Corrected.—The principal shortcomings of the camp in its early days were: not enough roads, no walks, no proper surface drainage, insufficient kitchens, no adequate mess-halls, poor latrines, almost no bathing facilities, inadequate delousing facilities, no sufficient means of hand-washing, no means of sterilizing mess-kits, inadequate water supply, and shortage of fuel. To explain these lacks it is necessary to state that there was at first a lack of properly trained personnel; that masses of men arrived before they were expected; that there was a shortage of material of all kinds and of motor transportation; in short, that the tide of men turned before the machine could be reversed and made to work in the opposite direction.

By April, 1919, these shortcomings had practically all been corrected. It may be said that, in May and June, Camp Pontanezen was one of the best military camps used for embarkation purposes that had ever been built. In March and April all necessary roads and walks had

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been completed. Barracks, floored tents, messing and bathing facilities were adequate. Delousing facilities were adequate in May and June, 1919, and kitchen incinerators were completed. Latrines were sufficient in number, and the water supply was completed and was ample for all purposes. Considerable time and a large amount of labor were required to build the large 15,000,000-gallon reservoir and to sink the two driven wells. By April the disposal of waste was satisfactory. From November, 1918, to July 1, 1919, there were no intestinal-borne diseases at Pontanezen. Not a single case of typhoid or paratyphoid could be traced to the water supply, latrines, or in any way attributed to conditions at the camp. Some of the betterments were probably the result of criticism, but the main betterments were thought of from the beginning of December, 1918, and were made as rapidly as possible.

AUTHORITIES

"Medical History of Base Section Five," Col. Guy L. Edie, M. C.

"The Medical Department of Camp Pontanezen, Brest, France," Col. M. C. Stayer, M. C., and 1st Lieut. G. R. Cowgill, M. C.

"Statements," Col. L. L. Smith, M. C.

"History of Camp Hospital, No. 33."

REMEMBER THAT OUR NEXT ANNUAL MEETING IMMEDIATELY PRECEDES THAT OF THE A. M. A. AT NEW ORLEANS. BETTER MAKE IT A POINT TO COME TO BOTH.

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EDITORIAL

Sometimes it seems as though Sisyphus, who rolled his perverse stone up the declivity, had no worse task than that which has fallen to those who have taken the Hippocratic oath. He was sentenced ever to begin again at the foot of the hill and his work was never done. With us of the profession of medicine, it is like those persistent quantities in mathematics, "surds"—were they not? The things which were always approaching their limit, but never quite reached it.

We dig industriously away at the abolition of sickness and disease, and when we are congratulating ourselves that by our advances in medical science we are ridding the world of some of the ills that flesh is heir to, something else looms on the horizon and our clear sky of health is clouded by another pest.

We put our shoulder to the wheel and, after much thought, many experiments and a far-reaching campaign of unceasing vigilance, we heaved a sigh and said, "Thank heaven, there will be no more Yellow Fever; we have banished that." With patient eye at the microscope and with much precise labor we evolved a way to obviate the occurrence of epidemic Typhoid. Another scourge under control. Diphtheria is not the black curse that it used to be, and we have wiped from our slate many of the things which used to decimate the land. But while we were congratulating ourselves on our accomplishment, we came to reckon with the plague of Influenza. Immersed as we were at the time of its initial outbreak in the bloody game of war, it seems as though we did not realize to what extent it was a menace. Even now it is doubtful if the majority of the people regard it as a serious competitor as a taker of life with the guns that thundered.

And yet, if we should read the statistics, what a puny force man in his efforts of destruction would appear in comparison with this swift, relentless force which moved with so little machinery, such a minimum of initial effort, to make the casualties of war seem slight.

Now, after a winter of it and a recurrent winter, what do we know really in respect to the mechanism of the disease? We have our theories, yes; our bacillus of Pfeiffer and Friedlander and our chains of various streptococci, but even now, it is a brave diagnostician who will put a positive finger on one and assert that here we have the initial cause. Clinically we know it, yes; we are familiar with the pathologic picture up to the point of the question of the primal cause. As to treatment, we are little better off than we used to be in respect to the maladies which we have put in the list of the things which used to be. Excepting

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the not altogether proved value of the serologic treatment, we are not much beyond the treatment of the symptoms. So far we have been rather powerless against it. We were advised of the westward march of the epidemic and could do nothing to prevent the invasion of our own shores. We predicted this invasion, but conceded that it was hardly probable that any measures of quarantine would keep us clean from its soiling touch. And here we are, with this problem on our hands and in our minds, as Sisyphus with his stone. Some of ours we have rolled over the crest of the hill for the last time, but this has come to take the place of those which have gone, and we must bend our shoulders to it in the effort to write finis after it as we have with some of the others.

None of us doubts that some time, in some way, we shall solve the problem and eventually stand as victors in this conflict also.

. . . . .

The world war brought new and strange things to our brothers of the line. Novel ideas in blotting out our enemies. Never was a war before which was fought on the earth, under the earth and in the heavens above the earth, nor one which drew so on the ingenuity of the human mind in devising fresh ways of killing.

We had the reaction of this in the application of medical science. As the engines of war multiplied and changed, so had we to adapt ourselves to them and change our plans to meet each fresh condition. What a field poison gas opened up. Not only in the rather futile effort to find remedies which should help the choked wretch back to life, but in what is always the great side of medicine, prophylaxis: the ways and means which shall make harmless the onset of disease. It is probable that never before have organic and inorganic compounds been so closely studied nor so intimately known. The dichlorethylsulphide, which was a noxious curiosity to Victor Mayer when he discovered it in 1886, is now quite familiar to us all as mustard gas. Phosgene and chlorine and the other evil-smelling, deadly, unpronounceable compounds have been dragged out of the dark corners of the chemical laboratories and found, for the time being, their place in the sun. And with their advent came the measures to estimate their killing powers and those which could be depended on to render them less deadly or to repair the ravages they wrought.

We learned to minimize tetanus; to do away with the bacillus perfringens and its attendant gas gangrene. We found novel ways to combat infection, to repair seemingly hopeless gaps and mutilations. And finally we had to assume a new rôle and to take on a new importance. Constant killing and wounding has, as its ultimate limit, the

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figure of the population. The dead we could not call back from Flanders fields, but we did the next best thing. We improved our means of patching and cobbling, and we sent back to the front as effective fighting men many who had been shoved into the discard as of no further use in the line. We went further than the mission of healing those who were stricken; we changed ourselves into a salvage corps whose duty was to cull, from the heap of the supposedly unfit, those who by more advanced methods and increased cunning might be made whole, or so nearly so that the slight percentage of defect should have no weight against the balance of their power.

And now, when it has finished and the guns are silent, we are opening up new fields in the line of reconstruction and reëducation and making worth while, to the state and to themselves, many who in older times would have limped useless through the remainder of their crippled lives. It has brought a further good, too. For, grievous as are the injuries of war, there is a ceaseless war of machines against man, and in this the toll of wounded is heavy, far heavier than any know who are not informed as to economic conditions. And to these who have been hurt in this peace-time war will come the help and benefit which is being worked out for the salvation of their brothers who wore the uniform of the fighting men. So may peace profit by the lessons of war.

. . . . .

ANNUAL MEETING

The annual meeting of the Association will be held in New Orleans on the 22d, 23d, and 24th of April next. The meeting of the American Medical Association will open on Monday, the 26th. Notice as to the headquarters of our meeting will be given in the April issue of THE MILITARY SURGEON. It is hoped that the attendance may be large. Our association is the one important one of its class in the United States and numbers among its members many distinguished men. The meetings are of interest not only for the addresses and discussions but for the opportunity of meeting those who make up the association and making new friendships, as well as renewing old ones.

It is desired to call attention to a fact which has perhaps not been sufficiently well understood heretofore, and that is, that aside from those who make up the membership of the association all medical men are welcome at the sessions. It would be well if this were more generally understood. We are glad to have the company of any who are interested, and that they may have the opportunity of knowing what the association is and what is its work. It is suggested that the members

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make this known. Invitations have been sent to a number of the foreign governments to send delegates to the meeting, and several have expressed their intention of doing so.

As an old society and one which is becoming better known each year, it is desirable that we turn out in force. A tentative program of the meeting will be published in the coming issue of this magazine, the number for April.

J. R. C.

ANNUAL MEETING OF THE ASSOCIATION WILL BE HELD IN NEW ORLEANS, APRIL 22, 23 and 24. MEETING OF THE A. M. A. BEGINS APRIL 26. BEAR THIS IN MIND.

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ASSOCIATION NOTES

At a meeting of the Executive Council of The Association of Military Surgeons, February 14, 1920, the following names were proposed and elected to membership in the Association:

Medical Corps, U. S. Army

Lieutenant Colonels

Burton O. Clark
Peter D. MacNaughton
Justin M. Waugh

Majors

Howard H. Bell
Frederic J. Cotton
Moses Hubbard Darnall
Charles S. Dryer
Edgar C. Duncan
Herbert L. Freeland
Edmund Burt Owens
James E. Rawlings
John A. Robison
Bernard Samuels
Wood S. Woolford

Captains

Clarence J. D'Alton
James W. Anderson
Edwin C. Bakes
Henry R. Baremore, Jr.
Abraham A. Brill
Samuel J. Benoit
Charles H. Bryan
William B. Cantrell
Fred R. Clapp
John K. Crandall
William H. Crawford
Malcom M. Crocker
Timothy F. Donovan
George S. Drake
Clifford W. Hendrickson
Carl B. Herrimann
Thomas E. Horner
John P. Jones
Palle P. M. Jorgensen
Joseph W. Kimberlin
George S. Lambeth
John L. Messmore
Joseph L. Morrissey
Herbert W. Nafey
Albin B. Phillips
Robert C. Panter
Carl M. Pohl
Franklin W. S. Raiter
Jesse McC. Reed
Philip Rice
Anthony B. Russell
James C. Sartor
Joseph O. Schraunn
Ivy Stensell
William M. Sylvis
Jacob Washton
John R. Williams
John W. Wilson
William R. Woodbury

First Lieutenants

Robert S. Andrews
Geo. W. Bagley
Harold D. Barnard
Floyd E. Best
Martin T. Brewer
Eugene H. Brown
Roy A. Buckner
Joseph A. Buckwalter
William E. Campbell
Matthew J. Fitzpatrick
Eric J. Gambee
Paul T. Hope
Elbert V. Kring
Jesse P. Lockhard
Francis J. McMenamin
Nolie Mumey
Magnus J. Myres
Ulus E. Nickell
John W. Ovitz
Seymour H. Rowland
Herman S. Rhu
Verner T. Scott
Alvin E. Siegel
William H. Sloan
Roy A. Taylor
Frank M. Whiting

Medical Reserve Corps, U. S. Army

Lieutenant Colonels

Carter S. Cole
David C. Hall
George E. Houck
Archie C. Van Cleve

Majors

Richard D. Bell
Charles E. Beltzer
Nathan W. Brown
Delane S. Calhoun
William A. Downes
Harry S. Fish
Elden H. H. Foster
R. A. McBrayer
Peter A. Reque
Edward B. Towne
Frank B. Whitmore
Edward F. Ziegelman

Captains

David A. Baker
Charles P. Benson
Hugh E. Conwell
Robert D. Ferguson
Versile M. Gates
John H. Graff
John W. Horn
Irvin S. Koll

Medical Reserve Corps, U. S. Army

Captains

Arvine E. Mozingo
James D. Tunnell
Luther L. Turner

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First Lieutenant

Oscar V. N. Linhardt

Medical Corps, U. S. Navy

Commander

Herbert L. Kelley

M. C., U. S. N. R. F.

Lieutenants

Lawrence W. Ehegartner
William H. Gaul
Joseph N. Gehlen
Ray W. Hayworth
Vincent H. Usera
Harold S. Hulbert
Harry E. Kaplan
Antonius A. Larsen

M. C., N. G., U. S.

Captain

Charles G. Wright

U. S. P. H. S.

P. A. Surgeons

David E. Arnold
William A. Flick
Elbert C. Reitzel

A. A. Surgeon

S. S. Marchbanks

Associate Members

Contract Surgeon, U. S. Army

Bartlett U. Sims

Colonel, Dental Corps, U. S. Army

Franklin F. Wing

REMEMBER THAT OUR NEXT ANNUAL MEETING IMMEDIATELY PRECEDES THAT OF THE A. M. A. AT NEW ORLEANS. BETTER MAKE IT A POINT TO COME TO BOTH.

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COMMENT AND CRITICISM

GOVERNMENT NEEDS PHYSICIANS

The United States Civil Service Commission announces that a large number of physicians are needed for employment in the Indian Service, the Public Health Service, the Coast and Geodetic Survey, and the Panama Canal Service. Both men and women will be admitted to examinations, but appointing officers have the legal right to specify the sex desired when requesting the certification of eligibles.

Entrance salaries as high as $200 a month are offered, with prospect of promotion in some branches to $250, $300, and higher rates for special positions.

Further information and application blanks may be obtained from the secretary of the U. S. Civil Service Board at Boston, New York, Philadelphia, Atlanta, Cincinnati, Chicago, St. Paul, St. Louis, New Orleans, Seattle or San Francisco, or from the U. S. Civil Service Commission at Washington, D. C.

PHARMACOPOEIAL CONVENTION, MAY 11, 1920

In harmony with the requirements of the by-laws, attention of interested parties is called to the meeting of the Tenth Decennial Pharmacopoeial Convention of the United States, to be held beginning at 10 a. m., May 11, 1920, at the Willard Hotel, Washington, D. C. All incorporated bodies and other institutions entitled to membership in this convention are entitled to at once apply to Dr. Noble P. Barnes, Arlington Hotel, Washington, D. C., for the necessary blanks for membership in the convention.

Prior to the meeting of the convention, the Committee on Credentials will meet in Washington to consider all applications which are made It is important, therefore, that all applications for membership should be in the hands of Dr. Barnes at least six weeks before the date of the meeting. It will be difficult to consider, properly, credentials which are delayed beyond that date and especially those which may be presented at the time of meeting.

Sincerely.

B. H. W. WILEY,
President, 9th Decennial
Pharmacopoeial Convention of the United States.

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THE ROYAL INSTITUTE OF PUBLIC HEALTH

CONGRESS IN BRUSSELS

THURSDAY, MAY 20, TO MONDAY, MAY 24, 1920, INCLUSIVE

PATRON:

HIS MAJESTY THE KING OF THE BELGIANS

37, RUSSELL SQUARE, LONDON, W. C. 1.

9th January, 1920.

DEAR SIR:

The Council will be obliged if you will kindly give publicity in your journal to the Congress of the Institute which is being held in Brussels in 1920 on the Invitation of Monsieur Adolphe Max (the Bergomaster), and the Rectors of the various Belgian universities.

The Council will also be glad to welcome any delegates of your Association at the meeting, and pleased to receive the titles of any papers which they may desire to read.

The Council have invited delegates from the British universities, municipal corporations and other bodies interested in the public health, and they have taken steps through the British division of the American University Union in Europe to extend a like invitation to the universities, municipal corporations and public health associations in the United States.

It is believed His Majesty The King of the Belgians will be present at the inaugural meeting, and, from the generous support of the Brussels organizing Committee, and the assistance of the various government departments, the meeting will prove most instructive and enjoyable.

Yours faithfully,

T. N. KELYNACK,
Honorary Secretary.

AMERICAN PHYSICAL EDUCATION ASSOCIATION PROGRAM

TENTATIVE FINAL NEW YORK CITY, APRIL 7-10, 1920, WALDORF-ASTORIA-MCALPIN

Wednesday, April 7

Morning and afternoon—Registration and Visitation Trips.

7.30 p. m.—Music and Reception.

Welcome Address—Dr. John H. Finley.

Presidential Address—Dr. Dudley B Reed.

Folk Dancing by Delegates—Eliz. Burchenal in charge.

Thursday, April 8

9.30 a. m.—Public School Section meeting.

2.00 p. m.—Sectional meetings.

8.00 p. m.—Pageant as provided by New York Society.

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Friday, April 9

9.30 a. m.—General meeting.

Problems in Recruiting Teachers in Physical Education Prof. Elmer Berry.

Educational Tests for Physical Efficiency—Prof. E. L. Thorndike.

Health and the High Cost of Living—Prof. Irving Fisher.

2.30 p. m.—General meeting.

Progress in Physical Education Legislation.

Address—Prof. F. S. Lee, Columbia.

Relation of Physical Education to Leisure Time in Industry—Dr. George E. Vincent—President Rockefeller Foundation.

6.45 p. m.—Convention Banquet.

Addresses:

Col. Campbell—"Physical Training at Aldershot."

Dr. Eliott

Dr. Butler

Toasts:

Dr. D. A. Sargent

Dr. T. A. Storey

Saturday, April 10

9.30 a. m.—General Meeting.

The Place of Physical Education in the General Scheme of Education—Dr. Snedden, Pres. of National Ass'n for Vocational Training.

Discussion of Printed Reports.

Business meeting and Adjournment of Convention.

12.00—Luncheon—A. P. E. A. Council Meeting.

THE NATIONAL ANESTHESIA RESEARCH SOCIETY

Announcement is made of the launching of the National Anesthesia Research Society, with the avowed purpose of collecting data and prosecuting original research in this field of medicine. The objects of the Society as set forth in the constitution are:

To promote the science of anaesthesia and to enable its members, after first having obtained the approval of the Society, to submit without prejudice to the dental and medical professions, any views, findings, or accomplishments they have attained; to obtain from all available sources such information as is now extant concerning any material, liquid or gas, known to have anaesthetic properties; to arrange, in cooperation with dental, medical, and anesthesia associations for the

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preparation and delivery of suitable interesting and educational papers on the general subject, or relative to some particular anesthetic; to use influence to prevent the publication or circulation of any false or unauthentic statements concerning any and all conditions, symptoms, or phenomena prevailing during or after anesthesia by any anesthetic, and to prepare and distribute on request, forms on which such information can be tabulated with uniformity; to distribute by pamphlet or publication, as its funds may permit, and its governing powers authorize, such reliable data as it may collect or obtain through its members or others interested in the subject of anesthesia, for use by the medical and dental professions; to coöperate with state authorities and other bodies in the preparation fo suitable legislation to safeguard those to whom anesthetics are administered as well as those called upon to administer them; to use its influence in every way and to give its aid toward the advancement of the Science of Anesthesia.

The Research Committee which will have supervision of original work and the editing of material designed for the profession and professional press, is headed by F. H. McMechan, A.M., M.D., of Avon Lake, Ohio, editor of the Quarterly Supplement of the American Year Book of Anesthesia and Analgesia. W. I. Jones, D.D.S., president of the Inter-State Anesthetists' Association, will have an active part in the committee's work. Representative anesthetists of the country, who have distinguished themselves by research and progress in their field, are being invited to join the committee.

The Society has been endowed with limited funds which will permit it to demonstrate that there is a field of usefulness for it.

In compliance with request of the Bureau of the Public Health Service, we reprint the following:

VENEREAL DISEASE CONTROL ACTIVITIES

EDUCATIONAL AND MEDICAL CAMPAIGN OF THE DIVISION OF VENEREAL DISEASES DURING THE FISCAL YEAR ENDED JUNE 30, 1919.[1]

By Charles V. Herdliska

Acting Assistant Surgeon, United States Public Health Service

During the fiscal year ended June 30, 1919, the Division of Venereal Diseases of the Public Health Service conducted a highly successful program for nation-wide control of venereal diseases. This campaign was conducted with physicians, dentists, druggists, nurses, medical and allied colleges, professional journals and advertising media throughout the country. This report gives some idea of one branch of the work that is being carried on by the Division of Venereal Diseases, as well as the methods which have been employed.

Physicians

In order that physicians might be impressed with the seriousness of the problem of venereal diseases and realize their responsibility to the public in carrying out the

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[1] Reprint from the Public Health Reports, vol. 34, No. 41, Oct. 10, 1919, pp. 2241–2247.

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control program by reporting such diseases coming to their attention, and also to give each physician an opportunity to secure a copy of the revised Manual of Treatment of the Venereal Diseases, a communication was sent to approximately 132,000 doctors in the United States.

This communication consisted of a letter, a bulletin (V. D. No. 35), "An Appeal to Physicians for Coöperation," and an agreement card. The letter asked for the coöperation of every physician in the control program, and promised a copy of the manual to each one who signed an agreement card. In the bulletin the physician's individual responsibility was pointed out, and it was made clear that the attitude of the medical profession as a whole would determine largely whether venereal diseases are to be brought under control.

Each physician was urged to sign and return the card whereby he agreed:

1. To report cases of venereal diseases in accordance with the laws and board of health regulations.

2. To secure prompt treatment for all venereal cases coming to his attention, either treating them himself or referring them to a clinic or physician known to be competent in the treatment of such cases.

3. Not to dispense medicines for venereal diseases except where they cannot be obtained from a drug store; and not to recommend, prescribe, or sell any proprietary remedy marketed for the self-treatment of venereal diseases.

4. To give every venereal disease patient a circular of instructions, a supply of which is to be furnished free of charge by the Public Health Service or the State Board of Health.

As a result of this letter, agreement cards and favorable replies have been received from 60,666 physicians, or nearly 50 per cent of the medical profession of the United States. It is felt that this response is very gratifying and that the ultimate coöperation of the entire medical profession is assured.

In accordance with the usual policy of the Service, the cards of agreement received were forwarded to the state boards of health with a list of the physicians to whom the letter was sent. Each state board was asked to communicate with the physicians who have not responded and to secure their coöperation. It was suggested to each state that a supply of the manuals be purchased for distribution to those physicians who signed agreement cards. At the close of the year, June 30, 1919, 35 states had responded by purchasing 71,300 copies of this manual. Physicians in states which have not bought copies of the manual are receiving them from the Service. A record of the number of physicians pledging their coöperation and of the manuals purchased by states is shown in the table.

Medical and Allied Schools, Colleges, and Universities

In order that physicians may be better equipped to handle cases of venereal diseases scientifically, a plan was suggested by the Service to the medical and allied schools, colleges, and universities in the United States, having in view two objects:

1. To enlarge and improve courses in the diagnosis and treatment of venereal diseases so as to include laboratory and clinical facilities in colleges where these courses are being taught; and to have such courses introduced as major courses in colleges where they are not being taught, that the students in medical schools and colleges may be equipped to handle these diseases when they begin to practice.

2. To offer special courses covering short periods of time, which men who are now practicing can take in order to prepare themselves to handle these diseases according to the best scientific methods. This program applies primarily to medical

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schools and colleges. It is important, however, that all schools of dentistry, pharmacy, and other allied schools have adequate training in the pathology of venereal diseases.

Preliminary to presenting this program to the medical and allied schools of the country, conferences were held at the universities in Washington, D. C., including the professional schools of Georgetown, George Washington, and Howard Universities. These conferences included addresses on—

1. The sanitary attack upon venereal diseases.
2. The better teaching of venereal diseases in schools, clinics, and hospitals.
3. The place of venereal diseases in medical, dental, and pharmaceutical schools, in hospitals, clinics, and training schools for nurses.
4. The importance of a proper knowledge of venereal diseases, not only to physicians but also to dentists, druggists, and nurses, and to college physical directors.

Social-hygiene films were shown and resolutions were adopted.

Using the program of the conferences held in Georgetown and George Washington Universities as a suggested form to be followed by other schools, a letter was sent to approximately 350 schools of medicine, dentistry, pharmacy, and physical education in the United States. Favorable replies have been received from all. The Georgetown University School of Medicine has broadened the work of the hygiene department, extended its curriculum, and increased its clinic facilities. The George Washington University Medical School has appointed a special teacher for this field, and has made plans for extending its lecture and clinical work, the new arrangement to go into operation with the beginning of the new school year. Howard University, representing the colored medical, dental, and pharmaceutical schools of the country, is making similar plans.

A second letter is now being sent out for the purpose of securing as early as possible the establishment in rural communities of extension courses for the benefit of the physicians and dentists who cannot leave their professional work to attend postgraduate or special courses in the fall, winter, or spring. The results of this plan are not yet apparent.

Nurses

Special courses were given at Columbia University summer sessions to prepare public-health nurses for work in venereal-disease control.

V. D. Bulletin No. 40, "Lectures to Nurses," has been issued. In this bulletin there is discussed the history, social significance, and pathology of venereal diseases, and their prevalence as shown by statistics in the Army and Navy. This pamphlet has been sent to 42,471 student nurses and 1,509 training schools for nurses in 44 States. From nurses 424 requests for literature have been received.

Among the conventions of nurses at which the control program has been presented and the nurse's responsibility emphasized, are the following:

National League of Nursing.

Graduate Nurses' Association.

National Organizations of Public Health Nursing.

The State Graduate Nurses' Associations of Connecticut, Illinois, Kansas, Kentucky, Louisiana, Massachusetts, Maine, Nebraska, New Jersey, North Dakota, Pennsylvania, Rhode Island, South Carolina, and Virginia.

The Alameda County Nurses' Association, Piedmont, Cal.

The New York City Federation of Public Health Nurses.

Local Nurses and the Lincoln Hospital Alumnae in New York City.

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Druggists

The campaign to secure the cooperation of druggists was launched in the fall of 1918, following the campaign with the advertising media. The purpose of this plan was to eliminate the sale of nostrums for the self-treatment of venereal diseases, and the prescribing by druggists of remedies for the treatment of these diseases.

A letter, inclosing V. D. Bulletin No. 21, "An Appeal to All Retail Druggists," and an agreement card, was sent to the 48,500 druggists in the United States. In this appeal druggists were asked:

1. Not to prescribe or recommend any remedy for a venereal disease.

2. Not to purchase any proprietary remedy to be sold to the public for self-treatment of a venereal disease, and not to sell any such remedy after January 15, 1919.

3. To refill only such prescriptions for the treatment of venereal disease as were given originally to the customer by a reputable physician who is still in charge of the case.

4. To distribute literature furnished by the Surgeon General to persons asking, without a physician's prescription, for remedies customarily confined to the treatment of a venereal disease, and to direct such persons to a reputable physician, to an approved clinic, or to the state board of health.

As a result of this communication and of a second letter sent out in January, 28,226, or nearly 60 per cent, of the druggists have favorably responded by letter or by agreement card.

This campaign was referred to the state boards of health in April. Each state was sent a list of the druggists and the replies received. A supply of V. D. Bulletin No. 36, "Disease and Health," and of V. D. Bulletin No. 2, "Responsibility of Druggists to the Public Health," was also sent to each state to be disrtibuted among the druggists who pledged their cooperation. The plan provided that a copy of the "Disease and Health" pamphlet should be given to each person asking for a venereal disease remedy without a doctor's prescription, and that every employe of a pharmacy should be given a copy of V. D. Bulletin No. 2 for his own information. Each state has been asked to continue the campaign until every druggists in the state has discontinued the prescribing and sale of proprietary remedies for venereal diseases.

The table on page 327 summarizes by states the campaign with physicians and druggists:

Advertising Media

In an effort to secure the elimination of advertisements of quack doctors and medical institutes in treating so-called private diseases, and of nostrums for the self-treatment of venereal disease, a letter was sent to the business managers of the 20,000 newspapers and magazines in the United States carrying advertising.

This letter was accompanied by V. D. Bulletin No. 12, "An Appeal to Advertising Media to Coöperate in the Fight Against Venereal Diseases," and an agreement card which each manager was asked to sign and return. Those signing the card agreed:

1. Not to print the advertisement of any doctor or medical institute offering to treat venereal diseases, either naming specific diseases or using indirect terms, such as "private diseases," "lost manhood," "discharges," "diseases peculiar to men," etc.

2. Not to print the advertisement of any nostrum described as effective in the self-treatment of venereal diseases.

It was known before beginning this campaign that the great majority of the 20,000

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REPORT OF CAMPAIGN WITH PHYSICIANS AND DRUGGISTS JULY 1, 1918 TO JUNE 30, 1919

Name.	Agreement cards signed by—		Manuals purchased by state boards of health for distribution to physicians	Pamphlets sent state boards of health for distribution to druggists	
	Physicians	Druggists		V. D. No. 36	V. D. No. 2
Total	60,666	28,226	71,300	809,598	132,831
Alabama	782	249	2,000	7,470	1,245
Arizona	171	63	250	1,890	315
Arkansas	917	457	1,000	13,710	2,285
California	2,555	554	4,100	16,620	2,770
Colorado	720	455	.....	13,650	2,275
Connecticut	594	334	1,300	10,020	1,670
Delaware	93	77	400	2,310	385
District of Columbia	380	96	800	2,880	480
Florida	440	231	500	6,930	1,155
Georgia	865	344	3,500	10,320	1,720
Idaho	197	180	200	5,400	900
Illinois	4,014	1,709	12,000	51,270	8,545
Indiana	1,503	979	5,000	29,370	4,895
Iowa	1,381	1,142	3,000	34,260	5,710
Kansas	1,076	742	3,000	22,260	3,710
Kentucky	1,071	395	.....	11,850	1,975
Louisiana	586	317	2,000	9,510	1,585
Maine	414	380	1,000	11,400	1,900
Maryland	732	239	.....	7,170	1,195
Massachusetts	2,473	1,222	1,000	36,660	6,110
Michigan	1,683	1,011	2,000	30,330	5,055
Minnesota	1,018	633	.....	18,990	3,165
Mississippi	643	299	1,800	8,970	1,495
Missouri	2,307	1,055	.....	31,650	5,275
Montana	229	231	500	6,930	1,155
Nebraska	773	607	.....	18,210	3,035
Nevada	62	29	.....	870	145
New Hampshire	237	261	.....	7,830	1,305
New Jersey	1,092	762	3,500	22,860	3,810
New Mexico	185	90	100	2,700	450
New York	4,488	2,594	.....	77,820	12,970
North Carolina	724	258	2,500	7,740	1,290
North Dakota	267	280	500	8,400	1,400
Ohio	2,557	827	2,000	24,810	4,135
Oklahoma	998	619	2,000	18,570	3,095
Oregon	457	284	750	8,520	1,420
Pennsylvania	4,051	1,439	.....	43,170	7,195
Rhode Island	276	192	.....	5,760	960
South Carolina	439	121	1,000	3,630	605
South Dakota	289	328	.....	9,840	1,640
Tennessee	1,197	282	.....	8,460	1,410
Texas	1,872	852	5,000	25,560	4,260
Utah	211	116	500	3,480	580
Vermont	268	142	100	4,260	710
Virginia	912	359	1,000	10,770	1,795
Washington	716	388	2,000	11,640	1,940
West Virginia	587	200	2,000	6,000	1,000
Wisconsin	1,071	749	3,000	22,470	3,745
Wyoming	93	53	.....	1,590	265
Miscellaneous	10,000	3,000	.....	52,818	6,701

periodicals were not carrying quack venereal-disease advertising, but as an educational measure and to inform them of the stand taken by the service it was considered advisable to include all.

The agreement cards and newspaper clippings received showed that approximately 19,800, or 99 per cent of the 20,000 newspapers and magazines circularized were coöperating. A special letter was then sent to the 200 papers which were still carrying objectionable matter. As a result 60 of these papers have agreed to change their policy, leaving only 140 which are still carrying venereal-disease advertising of this character.

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Many of the newspapers and magazines which have not carried quack venereal disease advertising for many years have said that they consider such advertising not only undesirable from the standpoint of a clean newspaper, but also injurious in its effects on the health of the communities they serve.

This campaign also has been referred to the state boards of health for completion.

Medical, Dental, Pharmaceutical, and Allied Journals

A campaign has also been launched by circular letter with the medical and allied journals of the country, the purpose of which is to secure their coöperation in giving publicity to the program presented to the medical and allied colleges. There have been sent out 1,700 letters to these professional journals. It is too early to tabulate results, but the replies being received show great interest and enthusiastic coöperation in the program outlined.

Dentists

A campaign with dentists was started in April by a conference held under the auspices of the National Capital Dental Society of the District of Columbia, at the George Washington Dental School. The purpose of this campaign is to secure the better instruction of dental students and practicing dentists in diseases of the mouth, especially syphilitic lesions of the mouth.

The letter to dental schools has already been mentioned. A letter inclosing an appeal and agreement card similar to those used for physicians and druggists has been prepared, and is now being sent out to the 45,000 dentists of the country.

NOTES ON VENEREAL DISEASE IN THE ARMY AT THE PRESENT TIME

The excellent record made by the draft army in its venereal disease rates, the intense interest taken in control of venereal diseases during the war and the fact that we are now passing, or have passed, back to a professional army status make it desirable that we consider whether or not we shall pass back to the old professional army rates of venereal disease and, if not, how we can best avoid doing so.

This matter has received the serious consideration of other branches of the War Department than the Surgeon General's Office.

The medical side of the problem is probably better known than the social side, but even it has involved a good deal of guesswork. As an example of this may be cited the statements which army and other authorities have put forth as to the value of drug prophylaxis of venereal disease, statements oftentimes so extreme as to indicate that such prophylaxis, properly applied, was infallibly preventive of venereal infection. This unintentional exaggeration possibly resulted for a time in increased exposures and infections; it is now resulting in loss of confidence in a measure of real value.

Since the early part of September a questionnaire to be answered under seal of confidence and secrecy has been submitted to each soldier in whom a new case of venereal disease was detected. Each man was free

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to answer or to refuse to answer all or any part of the questionnaire. Reports upon 3,000 cases were received by December 15, 1919, and compilation of these show the following results:

		Answers
(*a*) Months of service	79,852	2,910
(*b*) Gonorrhea	1,941	
(*b*) Chancroid	469	
(*b*) Syphilis	536	
(*c*) Origin, local	1,306	
(*c*) Origin, distant	825	
(*c*) Origin, foreign	676	
(*d*) In house of prostitution	632	
(*d*) Not in house of prostitution	2,157	
(*e*) Days elapsed before discovery	44,882	2,635
(*f*) Drink a factor	450	
(*f*) Drink not a factor	2,390	
Solicited	960	2,818
(*g*) Took prophylaxis	1,498	
(*g*) Did not take prophylaxis	1,333	
(*g*) Time elapsed when taken, hours	3,500	1,420
Stayed all night	512	
(*d*) Total amount paid	$4,828.24	
(*d*) Number who paid	1,502	
(*d*) Number who did not pay	1,263	
Number instructed	2,501	
Number not instructed	370	
(*h*) Number of exposures in year	35,670	2,398
(*h*) Number of exposures without prophylaxis	14,312	
(*i*) Efforts made to abate nuisance	364	
(*i*) No effort made	1,555	
Number of men who stayed all night and who took prophylaxis	178	
Number of hours elapsed between exposure and taking prophylaxis	551½	
Average number of elapsed hours	3¼	
Per cent of men staying all night who took prophylaxis	3.5	

(*a*) The average length of service, 27.4 months, indicates that we are again on a professional army status.

(*b*) Gonorrhea constitutes 65.8 per cent, chancroid 16 per cent, syphilis 18 per cent. This is a higher percentage of chancroid than usually obtains in our army in America, lower than obtained in France.

(*c*) A large proportion of infections are contracted at points remote from the place of service where detected.

(*d*) Only 22.6 per cent of infections were contacted in houses of prostitution and only half of the men paid for infecting intercourse. This shows that commercialized vice is not responsible for nearly all venereal disease and that control of the two does not go parallel.

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(*e*) The average time elapsing between exposure to and detection of disease was seventeen days. This is doubtless considerably longer than the average period of incubation, but the increase was largely due to absence on leave or otherwise at the time when the disease first appeared.

(*f*) Drink was admitted as a precedent of the infective intercourse in only one-sixth of the cases concerning which this information was furnished.

(*g*) More than half of the cases followed the use of prophylaxis. This was also true in the A. E. F.

A considerable number of infections followed quite prompt use of prophylaxis, within from ten minutes to one hour. The average time of use was 2½ hours, and, as all use up to twelve hours after intercourse was counted, it is evident that in most instances it was considerably less than that.

(*h*) The average number of exposures without prophylaxis for each infection following its neglect was 10.7, while the average number with prophylaxis for each infection following its use was 14.2.

I have elsewhere estimated that in the A. E. F. the use of prophylaxis reduced the liability to infection among the users to one-third of what that would have been without it. These figures do not support so favorable a conclusion, but it must be borne in mind that these deal only with infected men, whereas the estimate made for the A. E. F. included men who had escaped infection.

(*i*) It is noteworthy that, so far as known to the men, no efforts were made in three-fourths of cases to confine, hospitalize, treat or otherwise deal with the infecting woman. There is great opportunity herein for activity on the part of civil authorities.

During the war prostitution and the sale of alcohol were forbidden within 5 miles, and later within 10 miles of camps. The measure was of undoubted value, as all sorts of studies indicate that, other things equal, venereal contacts increase as opportunities therefor abound. But that efforts expended near camps cannot nearly control venereal disease is shown above by the fact that in a considerable majority of instances the disease was contracted at a place distant from the camp or other place of detection.

Another table which is not here reproduced shows the places where infections were contracted, and it also shows that to prevent venereal disease in the Army we must prevent it throughout the country in general. It shows too that certain cities produce venereal disease in amounts disproportionate to their size and the number of soldiers to whom they are accessible. Among such places are Baltimore, Atlanta, Chattanooga, Columbus, Georgia, Des Moines, Newport News and

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Norfolk, Panama and Colon, St. Louis, San Antonio and Washington, D. C.

COLONEL P. M. ASHBURN,
Medical Corps, United States Army.

STATISTICS OF VENEREAL DISEASE IN THE ARMY OF THE UNITED STATES IN 1918

BY COLONEL P. M. ASHBURN
Medical Corps, United States Army

(With two illustrations)

1. The following basic facts upon which my computations and deductions are based are from the official sources indicated in the footnotes:

(*a*)	Mean strength of army in U. S.	1,381,429[1]
	Mean strength of Whites in U. S., per cent	92
	Mean strength of Negroes in U. S., per cent	8
(*b*)	Total number of venereal cases in U. S. in 1918	196,008[2]
	Total number of venereal cases in whites	123,023
	Total number of venereal cases in negroes	72,985
(*c*)	Increments—white—Draft to September	1,697,673[3]
	Draft October and November	127,283[4]
	Voluntary enlistments	199,089[5]
	Total white increment	2,024,045
	Negro—Draft to September	318,744
	Draft October and November	6,884[6]
	Enlistments negligible[5] and [4]	
	Total negro increment	325,628
	Total white and colored increments	2,349,673

(*d*) Rate of venereal infection found in incoming men = 5.669 per cent.[7] This rate applied to intake shows 133,203 cases introduced from civil life. Which leaves 62,805 cases which were developed after enlistment.

(*e*) For five years (1912–1916) before the war the rates for white and colored troops stationed in the United States averaged 93 and 105 respectively per 1,000 men per annum.[8]

Considering the great restrictions placed upon drink and prostitution within 5 and later 10 miles of camps in 1918, it seems fair to assume that the rates for new cases after entry into the service were equal for that year.

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[1] Report of Surgeon General, 1919, Table 4, Vol. 1, p. 59.
[2] *Idem.*, Table 516, p. 962.
[3] Table 20—Personnel Statistics Report A-14, Sept. 1, 1918. Statistics Branch, General Staff.
[4] Report of Surgeon General, 1919, Statistical Tables, Vol. I, Nativity Table, Table 1, p. II.
[5] Second Report of Provost Marshal General, Table 79.
[6] Same source as for white.
[7] Statistical Division, Surgeon General's Office.
[8] Reports of Surgeon General 1913 to 1917.

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(*f*) The increment by months were as follows, so nearly as I can determine.

	White	*Colored*
January	64,513	
February	101,735	8,241
March	129,072	28,680[9]
April	164,177	33,365[9]
May	397,925	932[9]
June	288,975	41,549
July	348,416	71,759
August	209,826	83,767
September	193,153	50,451
October and November	127,283	6,804

2. *Deductions.*—The incidence rate (62,805 cases in mean strength of 1,381,429) was 45.46 per 1,000 per annum.

8 per cent of this was negro = 5,024 negro cases developed in service.
92 per cent of this was white = 57,781 white cases developed in service.
123,023 minus 57,781 equals 65,242 white cases brought in from civil life by 2,023,945 men, giving infection rate of 3.22 per cent.
72,985 minus 5,024 equals 67,961 negro cases brought in from civil life by 325,548 men, giving an infection rate of 20.87 per cent.

3. An attempt was made to avoid sending men with venereal disease to the A. E. F. While not wholly successful, it was sufficiently so to eliminate from practical consideration the influence of introduced cases upon the incidence rate. No men were taken into the army after November 11, 1918, and from that date onward the U. S. rate should have been no more influenced by imported cases than was that of the A. E. F.

The A. E. F. cases were reported upon a basis of inspections and involved little duplication.

The U. S. cases were reported as sick and probably contained more duplications, but the rates at home and abroad were probably not far apart.

4. There is appended hereto a chart showing the weekly reported incidence of venereal disease in the U. S. and the A. E. F., the rates being expressed as annual rates per thousand men, figured on the basis of cases reported for each week shown. It is thought that the facts and deductions set forth above make this chart much more comprehensible than it is alone.

5. Chart No. 2 is submitted as proof of the correctness of my estimates. The solid line shows the *calculated* numbers of venereal cases for the various months. The broken line shows the cases actually placed on sick report. The discrepancies are thought to be explained fully by

[9] Same as sources [3] and [4].

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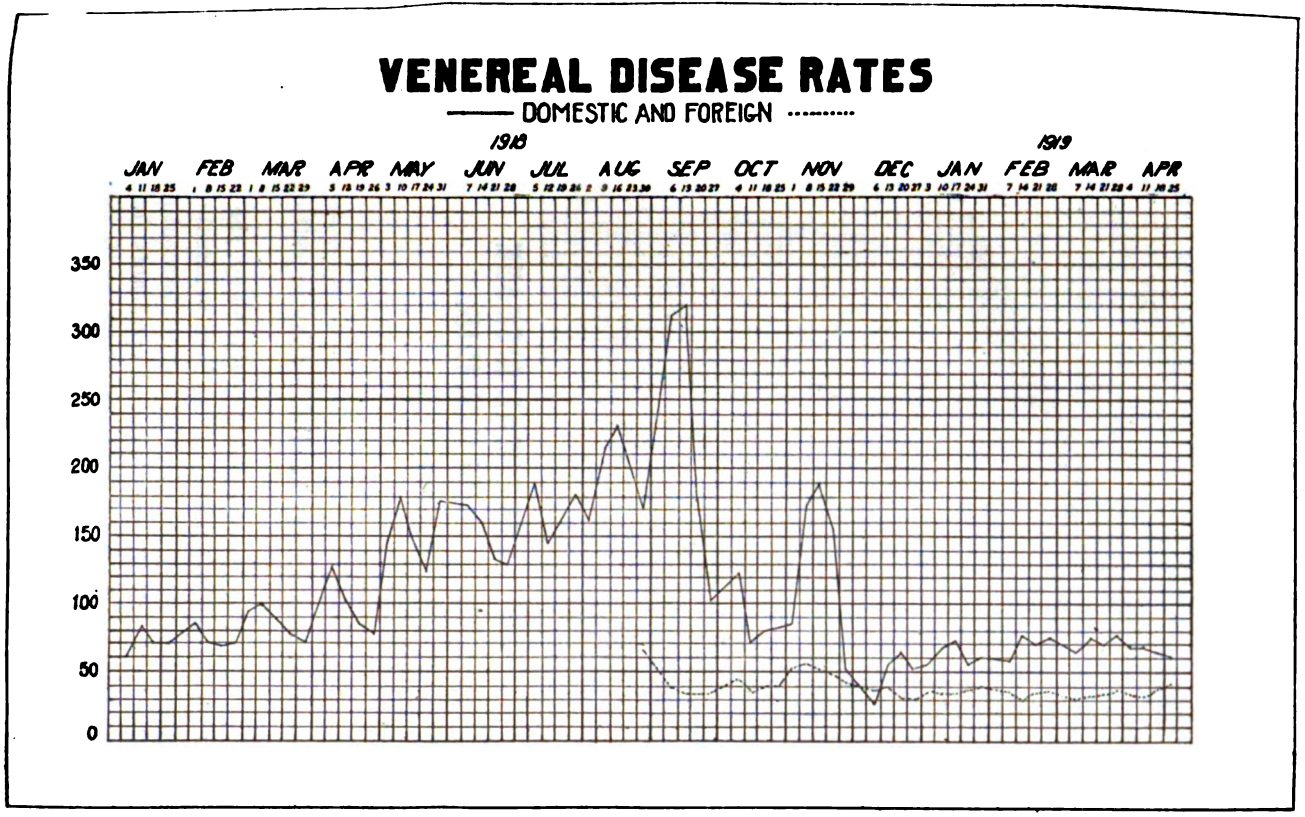

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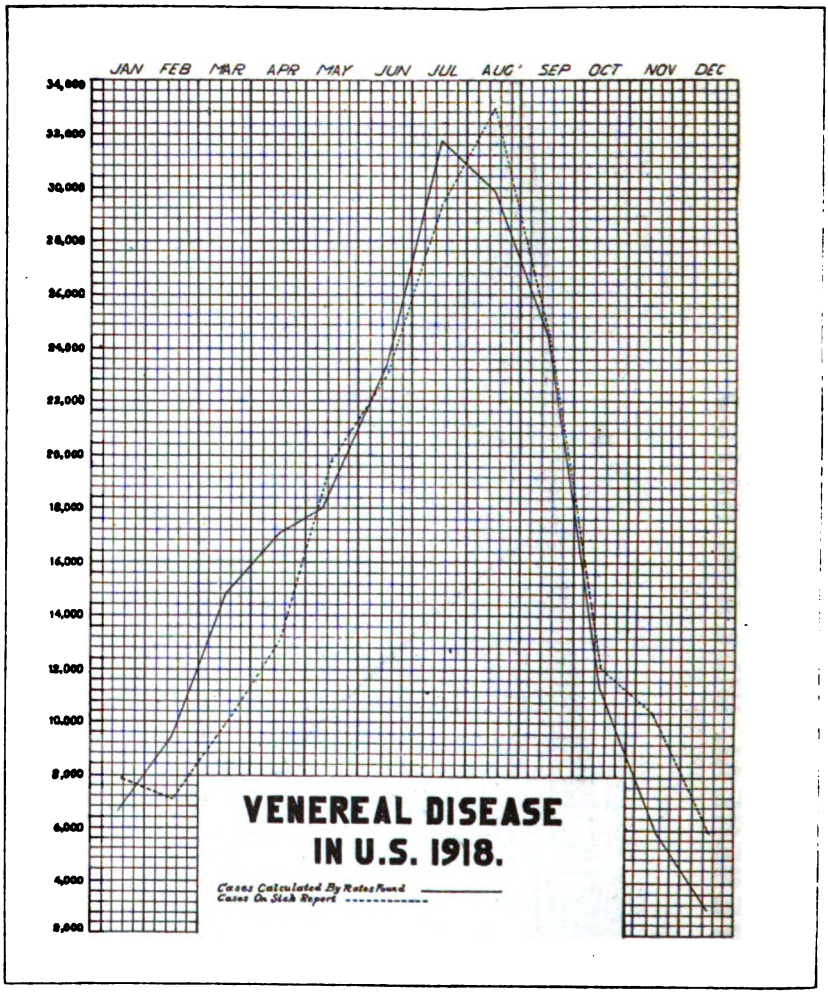

the constant and almost inevitable delay in getting cases on to sick report.

6. In 1918 there were enlisted in the Navy, the Naval Reserve and the Marine Corps 302,584[9] men free from venereal disease, the venereal infections being cause for rejection from enlistment and actually causing the rejection[10] of 15.31 per thousand applicants for the Navy, 8.98 per thousand for the Naval Reserve and 6.16 per thousand for the Marine Corps. The very large majority of men so rejected were caught in the draft and taken into the Army, further increasing the infection rate therein. Only one per cent of naval enlistments were colored men.

[10] Statement from office of Surgeon General of Navy.

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7. *Conclusions.*—(*a*) The incidence rate of venereal disease developed after entry into the army among men in the United States in 1918 was about 45 per 1,000 per annum.

(*b*) The proportion of Class A men (in the draft sense) between the ages of 21 and 31 years and of the white race who were found infected with venereal disease at the time of their entry into the service was (including naval and marine enlistments) less than 3 per cent.[11]

(*c*) The proportion of negroes of similar age and class so infected was above 20 per cent.[11]

[11] In general these figures relate to disease detected by clinical examinations without the aid of routine Wassermann tests or similar diagnostic refinement.

REMEMBER THAT OUR NEXT ANNUAL MEETING IMMEDIATELY PRECEDES THAT OF THE A. M. A. AT NEW ORLEANS. BETTER MAKE IT A POINT TO COME TO BOTH.

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BOOK REVIEWS

SHOCK AT THE FRONT, by William Townsend Porter. Boston: The Atlantic Monthly Press. Price, $1.25.

This very human little book of one hundred and fifty pages is written for the laity rather than for the profession. Inasmuch, however, as when we closed the door of the surgery and our minds to the problems of illness, we presumably revert for the time to this class, there is no reason why we should not appropriate for our use and benefit the good things of the lighter world.

To those who knew Dr. Porter as the precise man of science, the strict teacher, the delightfully whimsical style of this litle brochure may come as a surprise. It goes, however, to show that even the uncompromising pursuit of so obstruse a theme as physiology may have an underlying substratum of humanity.

Dr. Porter, pruning his writings of technical verbiage, forgetting the "reaction of degeneration"; that anatomic catch all, "the floor of the fourth ventricle," and the other scyllae and Charybdi between which we sailed such troubled courses in our student days, admits us to his personal confidence and takes us intimately with him while he kicks his heels in the dusty offices on the Boulevard St. Germain; in his wanderings in charming Compeigne and into and through the corpse-strewn front—that area of blood and barrage.

He is philosopher enough to extract humor from his trials of postponement and pitiful enough to see in the broken, human wreckage something more than a basis on which to prop a theory, which is that wound shock is due to the carriage of fat globules into the blood-vessels in wounds of the long bones and the viscera, the embolism transproduced causing the characteristic lowering of the blood-pressure and the bleeding to death of the patient within his own veins.

His descriptions are telling and vivid, none the less so by reason of his adoption of the French "short sentence" style (*staccato ostinato*), and a guarded use of the "historical present" which he so warmly commends as the sure haven of an alien speaking French.

His dissertation on Paul Bert and his physiologic rat is very delightful, as are all his descriptions.

We do wish, though, that he had kept his promise and told us what he thought about the Belgian police.

Perhaps he was afraid.

J. R. C.

INDUSTRIAL MEDICINE AND SURGERY, by Harry E. Mock, M.D., F.A.C.S., Assistant Professor of Industrial Medicine and Surgery at Rush Medical College; Attending Surgeon, Saint Luke's Hospital, Chicago; Lieutenant Colonel, Medical Corps, United States Army. With 210 illustrations. Philadelphia and London: W. B. Saunders Company, 1919. Price, $10.00.

Colonel Mock has presented to the profession a work that deviates from the usual character of a text-book on medicine and surgery. Instead of

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dealing with the individualistic practice of medicine he has produced a valuable treatise on group medicine that will be heartily welcomed by plant and industrial physicians, surgeons and sanitarians. He gives in detail the methods and procedures for conserving the lives and limbs of the working people and for reclaiming those disabled in the daily routine of the industrial world.

The book is divided into six parts, as follows: Part I, Industrial Health Service; Part II, Prevention; Part III, Industrial Medicine; Part IV, Industrial Surgery; Part V, Compensation, Insurance, Medico-legal Phases; Part VI, Reconstruction.

Part I describes the organization and operation of the medical and sanitary service of industrial plants and mercantile establishments. The functions of the medical staff and the industrial nurse are outlined and details are given for the practical working of the service. In Part II are discussed such matters as industrial hygiene, epidemiology in industry, health hazards in occupations, accident prevention, the National Safety Council, etc. The medical examination of employes, medical treatment of employes, women in industry, the tuberculosis employe and kindred subjects are treated in Part III. Part IV is an excellent dissertation on preventive surgery as applied to industry. First aid, emergency surgery, the subsequent or permanent treatment of certain injuries, the X-ray in industrial surgery, hand infections, open treatment of fractures and the employe's foot are discussed in an interesting manner. Part V is devoted to the consideration of employe's compensation from the medical standpoint, compensable hernia, health insurance, employe's mutual benefit associations and similar phases of industrial medicine. The important matters of Americanization of the foreign employe and human conversation and reclamation are dwelt upon in Part VI.

The typographical work is excellent, the paper is good, and the book is well illustrated.

FRANCIS M. MUNSON.

ORTHOPEDIC AND RECONSTRUCTION SURGERY, INDUSTRIAL AND CIVILIAN, by Fred H. Albee, A.B., M.D., Sc.D., F.A.C.S., Lieutenant Colonel, M. C., U S. A., etc., etc. With 804 illustrations. Philadelphia and London: W. B. Saunders Company, 1919. Price, $11.00.

The title of this valuable treatise, "Orthopedic and Reconstruction Surgery," indicates the metamorphosis that has taken place in the past ten years in this department of medicine. It no longer consists of an almost exclusively conservative therapy but now embraces the application of radical surgical procedures to the numerous deformities and distortions that were formerly regarded as amenable to relief only by conservative treatment. This work, while in no wise detracting from the importance of conservative methods, assembles and brings to the attention of the profession in a practical manner those surgical procedures which contribute so largely to the reclamation of the cripple and to the rehabilitation of the physically incompetent in military, industrial and civil life. It includes, in addition to the subject matter usually classified as "Orthopedic Surgery," the consideration

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of a large number of closely allied conditions originating either in the various present-day industrial organizations or in the Great War. The book is splendidly illustrated and the typographical work leaves nothing to be desired.

BOOKS RECEIVED

Books received are acknowledged in this department and such acknowledgment must be regarded as a sufficient return for the courtesy of the sender. Selections will be made for review in the interest of our readers and as space permits.

MODERN SURGERY: GENERAL AND OPERATIVE, by J. Chalmers DaCosta, M.D.; Samuel D. Gross, Professor of Surgery, Jefferson Medical College, Philadelphia, Pa. Eighth edition, revised, enlarged and reset. Octavo of 1,697 pages, with 1,177 illustrations, some of them in colors. Philadelphia and London: W. B. Saunders Company, 1919. Cloth, $8.00 net.

INDUSTRIAL MEDICINE AND SURGERY, by Harry E. Mock, M.D., F.A.C.S., Assistant. Professor of Industrial Medicine and Surgery at Rush Medical College. Octavo volume of 846 pages with 210 illustrations. Philadelphia and London: W. B. Saunders Company, 1919. Cloth, $10.00 net.

ORTHOPEDIC AND RECONSTRUCTION SURGERY, INDUSTRIAL AND CIVILIAN, by Fred H. Albee, M.D., F.A.C.S., Professor and Director of Department of Orthopedic Surgery at New York Post Graduate Medical School and at the University of Vermont. Octavo volume of 1,138 pages with 804 illustrations. Philadelphia and London: W. B. Saunders Company, 1919. Cloth, $11.00 net.

THE NOSE, PARANASAL SINUSES, NASOLACRIMAL PASSAGEWAYS, AND OLFACTORY ORGAN IN MAN, by J. Parsons Schaeffer, A.M., M.D., Ph.D. With 204 illustrations. Philadelphia: P. Blakistons Son & Company. Price, $10.00 net.

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Obituary

Those of our membership whose deaths have been noted since our last report are as follows:

Major J. Harry Collins, Medical Corps, U. S. Army.

Capt. Dwight S. Spellman, Medical Corps, U. S. Army.

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THE
MILITARY SURGEON

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ORIGINAL ARTICLES

Authors alone are responsible for the opinions expressed in their contributions

AN ANALYSIS OF 19,639 EARLY TREATMENTS FOR THE PREVENTION OF VENEREAL DISEASES AND OF 653 VENEREAL INFECTIONS OCCURRING AMONG THE U. S. NAVAL FORCE OF THE ASIATIC STATION

BY CAPTAIN C. E. RIGGS
Medical Corps, United States Navy

THE data included in the following statistics were collected among the personnel of our naval vessels cruising in the Far East and also from the naval shore stations in that part of the world, excepting Guam. The territory covered is extensive. It extends almost as far south as Australia; it includes the Philippine Islands, Japan, the China coast, and some of our gunboats penetrated hundreds of miles into the interior of China by way of the Yangtze River.

The collecting of statistics in such a vast expanse of territory means that the work must be performed under a wide variety of conditions. This may be considered as detracting somewhat from the value of the conclusions which the compiled figures seem to indicate. The work was done by more than forty medical officers, most of whom were particularly careful and conscientious in making their reports. The period of time covered is something less than a year, including parts of 1917 and 1918. At least 90 per cent of the statistics were collected at the following places: Manila and Olongapo in the Philippines; Nagasaki, Kobe and Yokohama in Japan; Hong Kong, Shanghai, and Vladivostok on the China coast; and Peking and the Yangtze River towns in the interior of China.

There is one important factor concerning the venereal situation presented here which makes it very different from those other situations with which we have become acquainted since the social hygiene movement has come to the fore. It is that all these people to whose evil influences our men were exposed were oriental or semi-oriental. The ethical viewpoint of the East on all subjects differs from our own, and

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the subject of sex morality forms no exception. Also, what are considered by some as allied factors for the spread of venereal diseases, such as the unrestricted sale of alcoholic drinks, poor economic and other social conditions, are in marked contrast to those met with in western countries, at least, in the United States. Because the ethical viewpoint of the East is different from that of the West does not necessarily mean that her morality in a given instance is inferior to our own. For example would anyone acquainted with the commercial honesty of the Chinese feel that their honesty is any less worthy than that which prevails throughout western civilization?

When it is desired to collect veneral statistics from various localities it is first necessary to prepare a proper blank form. This form should serve two useful purposes. In the first place, the figures and answers to questions on the form should give a mental picture of the venereal situation at the place concerned, and, also, the field work in collecting the data with the first hand information which it affords should stimulate efforts to obtain further improvement. A proper blank form is of the first importance. If the requirements of the form are captious or too exacting, it will defeat its own purposes. The form should be simple, and the questions and required figures should assist in pointing the way for further preventive activities.

In the preparation of the blank form which was used to collect the statistics under analysis here I was fortunate in having the advice and assistance of Commander W. A. Angwin, M. C., U. S. Navy, who had had considerable experience in collecting and analyzing venereal statistics. Tables 1 and 2 are actual instances of the use of this form.

In comparing Tables 1 and 2, it should be noted that the receiving ship at Cavite is practically a shore station and the *Brooklyn* a cruising ship. It is generally considered easier to control and prevent venereal disease among the personnel of a shore station than it is in the case of a vessel which cruises about from port to port. Of course the figures from any ship or station, if properly analyzed, should reflect rather faithfully the amount of attention the medical officer of that place gives to preventive work among his personnel.

At Cavite there were 15 infections for 325 men, which gives an annual rater per 1,000 of 553 and the annual rate for the *Brooklyn* was 419 per 1,000. Both ship and station claim that some of these infections were contracted at other places. To make further comparisons, one-half of the preventive treatments of the *Brooklyn* was administered before the third hour subsequent to exposure to the risk of infection, and for the shore station one-half was not given till the beginning of the seventh hour after exposure. While it is known that prophylactic

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TABLE 1.—*Monthly Report on Prophylaxis and Venereal Diseases U. S. Receiving Ship at Cavite, P. I., for the Month of January*, 1918

From: Medical Officer.
To: Commanding Officer.
Subject: Monthly Report Prophylaxis.

Av. comp.	No. liberties	No. treatments	No. infected after prophylaxis			No. infected without prophylaxis		
			Gon.	Chan.	Syph.	Gon.	Chan.	Syph.
325	2,110	321	1	1	0	7	5	1

Number of prophylactic treatments according to hour and number of failures for each hour

No. hours after first exposure	No. of treatments	Gon.	Chan.	Syph.	No. hours after first exposure	No. of treatments	Gon.	Chan.	Syph.
1	12	.....	.....	.....	11	11	.....	.....	.....
2	11	.....	.....	.....	12	42	.....	.....	.....
3	48	.....	.....	.....	13	18	.....	.....	.....
4	12	.....	.....	.....	14	4	.....	.....	.....
5	31	.....	.....	.....	15	11	.....	.....	.....
6	44	.....	.....	.....	over 15	2	.....	.....	.....
7	18	.....	.....	.....					
8	16	.....	.....	.....					
9	21	1	.....	.....					
10	20	.....	1	.....					

Is *yes* or *no* concerning exposure required from men returning from liberty? No.
Is punishment given for failure to take prophylaxis? No.
Are venereal inspections held at suitable intervals? Yes.
Number, if any, previously reported as chanroid here as syphilis? None.

TABLE 2.—*Monthly Report on Prophylaxis and Venereal Diseases, U. S. S. Brooklyn, for Month of December*, 1917

From: Medical Officer.
To: Commanding Officer.
Subject: Monthly Report Prophylaxis.

Av. comp.	No. liberties	No. treatments	No. infected after prophylaxis			No. infected without prophylaxis		
			Gon.	Chan.	Syph.	Gon.	Chan.	Syph.
630	4,300	708	8	9	1	0	2	2

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Number of treatments according to hours and number of failures for each hour.

No. hours after first exposure	No. of treatments	Gon.	Chan.	Syph.	No. hours after first exposure	No. of treatments	Gon.	Chan.	Syph.
1	75	.....	.....	.....	11	3	.....	1	.....
2	196	1	.....	.....	12	16	.....	.....	.....
3	180	2	2	.....	13	.....	.....	.....	1
4	117	3	1	.....	14	6	.....	.....	.....
5	48	1	1	.....	15	.....	.....	.....	.....
6	27	1	2	.....	17	1	.....	1	.....
7	16	.....	1	.....					
8	14	.....	.....	.....					
9	4	.....	.....	.....					
10	5	.....	.....	.....					

Is *yes* or *no* concerning exposure required from men returning from liberty? Yes.
Is punishment given for failure to take prophylaxis? Yes.
Are venereal inspections held at suitable intervals? Yes.
Number, if any, previously reported as chancroid here as syphilis? One.

treatments have their greatest efficiency if administered during the first, second or third hours, yet in the above instances Cavite had two infections following 321 treatments, and the *Brooklyn* 18 following 707 treatments, or 0.62 and 2.54 per cent, respectively.

To explain this unexpected result it is only necessary to look at the interrogatories at the bottom of the tables. There it is seen that the ship punishes for failure to take early treatment and the shore station does not. It is obvious that the 18 infections recorded as taking place in spite of prophylaxis are mostly errors due to misstatements made by those concerned for the purpose of avoiding the assigned punishment.

At places where punishments are given the men who, having exposed themselves to the risk of infection, deliberately fail to take advantage of early treatment, there is considerable difficulty in keeping a reliable record. In the case of young men who become infected, I think it is nearly always possible for the medical officer to obtain the truth by means of a confidential talk. It is different with older men, who are more sophisticated to service conditions. Such men seem to believe that, once having told a lie, it pays to stick to it.

If a medical officer has the time and inclination, he can see to it that his venereal prophylactic reports are truthful representations of the venereal situation within his command. He can also keep the preventive propaganda well before the members of his crew. Usually the best results are found in small units having an earnest, active medical officer. It seems that any man who has just acquired a venereal

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disease is entitled to an unrestricted confidential talk with his medical officer. Such men are nearly always very repentant and have a "never again" attitude which it is desirable to take advantage of. During these talks their unfounded fears can be quieted and their resolves strengthened. They are then more impressionable, good listeners, and will retain a great deal of what they are told. They will probably impart some of this information to their associates and thus become useful factors in the spreading of preventive propaganda.

For these reasons, the best reports in venereal prevention are found to come from small gunboats where the medical officers have the time to give considerable personal attention to preventive work. This is shown by taking the total of the smallest units of the station and comparing them with similar figures for the remainder of the fleet. There were six small units on the station having a total average complement of 264 in which the number of men in each unit was not less than 15 nor more than 66.

The totals for the small units and for the remainder of the force are as follows:

TABLE 3.—*Giving Comparative Data for Small and Large Units*

Av. com.	Liberties	Treatments	After prophylaxis			Without prophylaxis		
			Gon.	Chan.	Syph.	Gon.	Chan.	Syph.
2,315	93,361	13,303	164	178	16	70	59	14
264	18,000	2,517	20	15	1	1	0	0

The following interesting comparisons are made from the above table:

	Large units	*Small units*
Per cent of crews infected	21.64	14.01
Per cent of failures in treatment	2.69	1.43
Average number of liberties for each infection	186	486
Average number of treatments per man	5.7	9.0
Average number of liberties for each treatment	7.0	7.1
Average number of liberties for each gonorrheal infection	398	857
Average number of liberties for each chancroidal infection	393	1,200
Average number of liberties for each syphilis infection	3,112	18,000
Average number of liberties per man	40	68

Most of the above comparisons are favorable to the small units. An exception is that for the large units the number of prophylactic treatments is 5.7 per man, while for the smaller it is 9 per man, indicating a greater degree of libertinism on the part of the men of the small commands. However, when the number of liberties is compared to the

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number of treatments there is practically no difference, each showing an equal rate of dissipation for the large and small groups. If the same rate of infection had obtained in the large units as did in the small, there would be 177 less infections for the seven months. Or, other things being equal, if the preventive measures of the small units had been applied in the large units there would have been an annual saving from infection of 302 men, and an unusually large proportion of these would have been saved from syphilis.

It is reasonable to suppose that the venereal class of diseases varies less in its proportional numbers than any other class of germ-borne diseases. Firstly, each of the three kinds of venereal diseases has the same direct method of transmissions, and indirect transmission is rare. Secondly, their infectivity and virulence vary less than is probably the case with any other class of diseases. Of a total of 123,023 venereal infections taken from the report of the Surgeon General of the Army for the year 1918 the percentages for each kind (disregarding decimals) were: gonorrhea, 76; chanroid, 5; and syphilis, 18.

These proportions are for the year of the World War and probably do not represent actual condition as well as those calculated from peace-time statistics. In fact, they represent a rather wide departure from other statistics. In the Navy, taking the ten years from 1909 to 1918 inclusive, the first five years have the diseases appearing in the proportional numbers 63, 20 and 16, respectively, and the second five years 61, 24, and 14, respectively. Again, in the Army, the period from 1912 to 1916 has the three diseases, gonorrhea, chancroid, and syphilis, appearing as 59, 19 and 21, respectively.

The proportion of each kind of venereal disease that may be expected to appear in a community, or what may be termed the normal proportion, is principally of interest when one attempts to estimate the good that has been accomplished through an intensive preventive campaign. For example, in one of the above instances the comparative rates of infection for gonorrhea, chancroid and syphilis are 76, 5 and 18, respectively, and in another they are 61, 24 and 14, respectively. In the latter instance there is an increase of 19 chancroidal infections which is compensated for by a reduction of 15 gonorrhea and 4 syphilis. Therefore, considering the relative gravity of the infections and that such change was due to the application of certain preventive measures, it should be considered that these measures had been productive of good.

There happen to be available the statistical records of two intensive campaigns for the suppression of venereal diseases which were carried out in the naval service. The relative rates of infection from these

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two campaigns may be compared with similar rates of the entire Navy to determine if these campaigns have produced a favorable departure from the so-called normal relative rates. The results are as follows:

	Number of cases of—		
	Gonorrhea	Chancroid	Syphilis
Naval Training Station, [1] Norfolk, Va.	89	27	9
Asiatic Station (Table No. 4)	221	234	23
Totals	310	261	32
Relative proportion	51	43	5
Relative proportion for ten years in Navy	62	22	15
Differences	11	21	10

That is, in practically every 100 venereal infections of all kinds the preventive measures that were instituted resulted in substituting 21 chancroidal infections for 11 gonorrheal and 10 syphilitic. If this deduction be justified, it is obvious that this aspect of prevention alone, applied to the Navy as a whole, would result in an enormous saving of health.

The proportion in the prevalence of syphilis and gonorrhea is usually considered as 1 is to 5. Table 3 furnishes figures from which to ascertain these proportions under 3 different conditions of preventive work. Firstly, when no medical prophylactic treatment was applied; secondly, after prophylaxis; and, thirdly, after prophylaxis where there were opportunities for intensive preventive work. For the first condition the figures are 14 and 70, or the normal proportion of 1 to 5. For the second condition there are 164 gonorrhea and 16 syphilis or a proportion of about 1 to 10. And, for the third condition, the proportion of syphilis to gonorrhea is exactly 1 to 20.

It is probable that the two favorable changes were the results of the less thorough and the more thorough applications of so-called medical prophylaxis or early treatment. This branch of prevention was used throughout the station. Some medical officers placed a great deal of stress upon early treatment, while others supported it only in a perfunctory manner. There is available a record of 19,639 of these treatments in which the number of hours elapsing since exposure to the risk of infection is stated and, also, the number and kind of infection resulting from the exposure, in spite of the early treatments, are given for the corresponding hours. The records were made under such varying circumstances that a marked degree of accuracy cannot be

[1] Riggs: A study of Venereal Prophylaxis in the Navy. *Social Hygiene*, Vol. III, No. 3.

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claimed for them. In particular, since punishment for failure to take prophylaxis was quite uniformly enforced, it may be assumed that there are some instances when prophylaxis was not used as alleged.

A compilation of these statistics is shown in the following table:

TABLE 4.—*Giving the Treatments, Failures and Percentage of failures for Each Hour after Exposure*

Hours subsequent to exposure	Number of treatments	Number followed by			Totals	Percentage of failures
		Gon.	Chan.	Syph.		
1.....	3,453	7	20	4	31	0.897
2.....	4,400	27	43	3	73	1.659
3.....	3,104	26	31	3	60	1.932
4.....	2,034	19	20	2	41	2.015
5.....	1,216	28	16	3	47	3.865
6.....	1,179	21	20	1	42	3.562
7.....	742	13	16	1	30	4.043
8.....	862	23	18	0	41	4.756
9.....	534	17	11	1	29	5.430
10.....	645	10	12	1	23	3.565
More than 10....	1,470	30	27	4	61	4.149
Totals.....	19,639	221	234	23	478	2.433

Coincident with these infections there were 83 gonorrhea, 70 chancroid, 22 syphilis, occurring without prophylactic treatment.

This table is submitted with apologies, as no doubt it contains many errors that lessen the apparent efficiency of early treatments. However, there are some fundamental truths to be looked for. One is that, for a certain number of hours subsequent to exposure to the risk of infection, the earlier the treatments are administered the more effective they become. Another is that there are two periods where the efficiency of early treatments lessens markedly. These periods are between the first and second hours and between the fourth and fifth hours. Having observed a lessening of efficiency at the same periods in another table prepared in the same manner, I believe the occurrence cannot be considered accidental.

It is maintained by some that the employment of medical prophylaxis for the prevention of venereal diseases is wrong because it is an encouragement to incontinence. Edith Houghton Hooker,[1] in an analytical article, attacks the results of a study of venereal situation at the Naval Training Station, Norfolk, Va., arguing that the deductions from submitted figures concerning early treatments were incorrectly made. She states that no evidence is forthcoming as to the efficiency of arti-

[1] Hooker: A Criticism of Venereal Prophylaxis. *Social Hygiene*, Vol. IV, No. 2.

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ficial prophylaxis in the mere fact of only 125 men contracting disease after prophylaxis while 333 contracted disease without it, because "no figures are given with regard to the proportional number of those who exposed themselves to the infection." This argument is, of course, correct. As a matter of fact there are no figures available of those who exposed themselves to the risk of infection and did not take prophylaxis, from which we may deduce the percentage of infections that might normally be expected when no artificial preventive means were resorted to. An attempt to collect such statistics would probably prove impracticable. However, it may be assumed that early treatments given as late as ten or more hours after exposure are without preventive effect. If this assumption be correct, then, knowing the number of resulting diseases, the calculated percentages in such cases would be the same as if no prophylaxis were used.

It would be an ideal method of determining the efficiency of medical prophylaxis if it were possible to compare the number of infections following a certain number of exposures with the number of infections following an equal number of exposures in which prophylaxis was used. As statistics without prophylaxis are wanting, it remains to determine the efficiency of early treatments by examining such tables as Table 4, of which there is a number in existence. All these tables tell the same story. It is that medical prophylaxis is a remarkably efficient branch of prevention, in particular, if used within one hour subsequent to exposure to the risk of infection.

The same critic does not spare from attack even the first hour, for she states, concerning such immediate treatment, that "it is scarcely to be supposed that in any considerable proportion of the cases men can extricate themselves from the embraces of their prostitutes and get back to the sanitary tent within one hour of actually having had intercourse."

It seems to me that this assumption is not warranted by such facts as we have. At least, in the prophylactic table in the article under criticism there is recorded that 1180 men stated that they returned for their treatments within one hour after exposure, and in the table presented here 3,453 out of 19,639 men also state that they did likewise.

It is recognized that the use of artificial prophylaxis is the least ideal of those preventive means which actually prevent. This is because, theoretically, it seems dangerous to instruct men in any subject as to how they may depart from the path of virtue and at the same time possibly avoid the penalty. The road to absolute continence for the sailor is a long one. Much of his leisure time is spent as a stranger in strange surroundings. He has limited financial resources, and,

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consequently, is denied the comforts and better pleasures of the usual tourist. The following letter was received by me while the statistics presented here were being collected and is offered as an actual instance of the enlisted man's side of the case:

DR. C. E. RIGGS,
U. S. S. Brooklyn.
DEAR SIR:

I am taking the liberty to write this personal letter with the hope that you will do what you can to have me relieved from duty on the Yangtze River.

In the first place I have found out that with a crew of this size there is practically nothing to do, and especially the kind of work I will in the future be required to know. After being on a job like my last one, where I had to work continually, I find it impossible to lead a life of inactivity. Second, there are many men who enjoy themselves by visiting and mingling with the natives. Others find themselves welcome in saloons and dives. Men in uniform are not wanted in any houses except "pig-shacks." There are no clubs in which an enlisted man may find welcome and, of course, saloons are not open to men who do not drink. To sum up the whole thing, there is absolutely no place for enjoyment ashore and nothing to do aboard ship. It is a waste of time to stay on duty like this. No doubt there are many men who would like this duty.

Hoping I am not taking too much of your valuable time, and thanking you most sincerely, I am,

Very respectfully,

This letter has in it much that is true and yet not the whole truth. The circumstances under which an enlisted man finds himself ashore in oriental cities are most unfavorable. As stated, public entertainments do not exist in the Orient, or, if so, only in a form which is of no interest to him. The language is so strange that he cannot hope to learn more than a word or two of it. There is practically no opportunity to make new friends. When he has seen the strange people, streets and customs, he has exhausted about all available legitimate entertainment. He is not admitted to the local foreign clubs, and he is never seen about hotels of the better class. If he becomes tired from sight-seeing and wishes to sit down for a rest, or to find shelter from a passing shower, or to warm himself, there is no respectable place open to him. However, there are two classes of places in the Far East where he may find these facilities and, besides, be assured of a warm welcome while his money holds out, and these are the saloons and bawdy-houses. Of course, the frequenting of these places is against the better natures of most enlisted men, but it is to be expected that in the end the force of circumstances will have had its way.

Of course, educational prophylaxis is the ultimate solution of the venereal disease problem. This branch of prevention was urged and used throughout the Asiatic Station. Each medical officer imparted

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what information he thought was for the best, but there was probably considerable lack of uniformity in what was taught. We are, as yet, practically without means of estimating the good accomplished by preventive education as a whole, or any particular part of it, while, given a venereal prophylactic table, we can mathematically calculate from it the probable number and kind of diseases prevented. In regard to the statistics submitted here, the educational branch of prevention had its best try-out on board the small ships, and the incidences for the small and large units, according to Table 3, are 14.01 and 21.64 per cent, respectively. But early treatments were almost twice as efficient on the small as on the large ships—that is, the percentages of failures were 1.43 and 2.69, respectively. Apparently educational prophylaxis needs further study as to the good that may be accomplished by it, and, in particular, as to what should be taught and what should be omitted. It is also probable that many persons who are doing this teaching are unfitted to teach concerning sex matters, or, at most, unfitted to be given free latitude.

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A METHOD FOR THE MUSEUM DISPLAY OF THE GROSS PATHOLOGY OF WAR WOUNDS

By Major JAMES F. COUPAL, M. C., U. S. A.
Army Medical Museum, Washington, D. C.

(With eleven illustrations)

THE advances in the knowledge and treatment of war wounds during the World War have been so great that the author, while preparing specimens for mounting at the Army Medical Museum, has evolved the following procedure:

The medico-military interest in gunshot wounds in this conflict centers around new types of ordnance and the gas infections which were less frequent in previous wars and were never adequately investigated. These two factors are the basis of the classifications which follow. Because of the inaccuracy of the knowledge obtained in battle of the missiles causing injury, a classification of wounds on the basis of the separate wound-producing types of ordnance has not been strictly adhered to. Even when the missile was known at the time of injury the evidence has been lost through the general practice of using the term G. S. W. on the diagnosis tags. A classification by missiles can be followed out only in so far as the agents produce lesions peculiar to themselves, or where the missile is recovered from the tissues. Machine-gun and rifle wounds are placed in group one; shrapnel, high explosive shell, grenades, and aerial bombs in group two; and trench dagger and bayonet in group three. "Shrapnel" was frequently noted on the diagnosis tags, but there were actually few shrapnel wounds, as this type of ordnance was practically never used by either belligerent on the western front after the entry of the United States into the war.

A further division, dependent on the rapidity of action of the infectious processes, is necessary. Infections of relatively badly traumatized wounds proceeded, as a rule, with extreme rapidity. Changes from the gas gangrene group of organisms begin four to six hours after injury where the damage to tissue or its blood supply is extensive enough and most of their characteristic lesions are produced before the end of ten days. From the fifth to the twentieth day the ordinary pyogenic bacteria replace the gas gangrene group and produce changes in the lesions peculiar to themselves. Taking the time element as a basis, the following subdivision can be made: (*a*) Those that produce death or necessitate amputation in the first forty-eight hours, (*b*) those that produce the same results in more than two and less than twenty days, and (*c*) those that run to a partial repair and a certain

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degree of chronicity before they produce death or necessitate amputation. Class (*a*) comprise those cases that necessitate a speedy amputation because of rapidly progressing infection with the gas gangrene group and include cases with irreparable destruction of tissues. Class (*b*), the largest group, are practically all infected debrided wounds, most of the infections being with members of the gas gangrene group of organisms. These are by far the most interesting because of variations in the gross changes produced. Class (*c*) contains the later types where the ordinary pyogens have replaced the gas infections and the chronic infected wounds with sinuses and bone involvement result.

Technique of Preparation.—Specimens are washed for twenty-four hours to free them of the Kaiserling I or the 10 per cent formalin in which they are shipped, X-rayed, frozen and sectioned. The twenty-four-hour washing is necessary as the salts in the fixing solutions interfere with freezing. They are then frozen in a solid block of ice. Specimens showing much of the localized emphysema of gas gangrene freeze with difficulty as the changes in temperature cause a contraction and expansion of the imprisoned gases. This produces blow-holes in the ice blocks, which indicates that the muscle invaded by the gas is not frozen solid. If an attempt is made to saw the specimens in this condition, bone fragments or even heavy connective tissue fascias will be driven into the gas area by the saw, spoiling the most important part of the specimen. This occurs whenever the saw moves from a more resistant to a less resistant area in the tissue. The result is a shredding of fascias and rotation of bone fragments in the display surface of the specimen. It is therefore necessary to freeze thoroughly before sectioning.

The specimens are then sawed into serial sections from one-half to three-fourths of an inch in thickness in the longitudinal plane that, judging from the location of the injury and from the X-ray, will show the lesion to best advantage. These cuts include external sections showing the wounds of entrance and exit. A band or circular saw is best adapted for this work, but because of the frequent shell fragments an ordinary butcher's bone saw is safer for a beginner. A localization of the shell fragments by a two-plane X-ray is essential to avoid hitting the steel with the saw. This localization of the foreign bodies enables one to saw through the wound tract in such a plane that these bodies and any cloth fragments or other secondary missiles are properly displayed *in situ*.

Sections from the typical areas of gas gangrene and from the wound tracts are taken for microscopical examination. These are stained for bacteria by MacCallum's modification of Goodpasture's stain and

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other routine methods. These only, of course, show the morphology of the infecting organism, which is not a very valuable differentiation in a group of some thirty rod-shaped bacteria which differ little in size and staining qualities.

The first group of specimens, those originally obtained less than forty-eight hours after injury, show colors very well if they are sent through the Kaiserling II and III immediately after they are cut. This is important, as in solid specimens like extremities the penetration of the Kaiserling I or formalin is not very deep, and most of the excellent colors found in specimens that have been in these fluids for as much as eight months will be lost by delay.

In the specimens of gas gangrene in extremities with sinuses or large wound tracts, some of the reds of the normal muscle have been darkened by the long formalin fixation, though in these the typical brick-red of the muscle invaded by the gangrene group seems to resist this action. This is especially well defined in the specimens that have not been debrided extensively and where the lesion is being produced by a single member of the gas gangrene group. Multiple infections, especially where the putrifiers were a factor, always darken these reds.

The very early wounds without debridement give the best specimens from the standpoint of color and the demarcation of the pathological lesions. These usually show in the case of high explosive wounds a piece of uniform carried into the tissues in front of the missile, with frayed pieces stretching out behind in the wound tract like the tail of a comet.

Since practically all of these specimens were obtained by the writer while on duty with Evacuation Hospital No. 6 during the rush of work received from the Battle of the Argonne, the clinical histories are very meager. The cases came in bearing diagnosis tags which usually read as follows: Pvt. John Doe, Co. C, 100 Inf. G.S.W. Rt. Leg., A.T.S. tagged at 8 p.m., Oct. 22, 1918. Then in the stress of work in the operating rooms this data was very difficult to obtain for the autopsy records, and practically impossible where no autopsy was done, because of the speed of evacuation.

As much of the clinical data as could be obtained is given. A complete description of the gross and microscopical findings is made in each case. The gross description can be made very complete, as the pathological lesions are exactly defined in the serial sections and can be reconstructed from them. All of this information is filed with the protocol together with X-rays, microscopical slides, etc. In addition a lengthy label is printed on the museum jar by a method devised by Capt. Charles F. Silvester, the present Museum Preparator. Some

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of these labels contain a caption and twenty to twenty-five words. In addition, this method lends itself readily to local labeling, and certain localized lesions are brought quickly to the eye. An abstract of this data is contained in a folder attached to the museum case.

High explosive wounds of the tibia are especially important because the comminution of this bone practically always damages the posterior tibial artery or its branches. A vicious circle is established when, in addition to the vessel injury, extravasation and exudation in this region, held in as it is by dense fascia, is transposed into pressure. This further interferes with the circulation, causing a circulatory sluggishness or even stasis, conditions ideal for the progress of a gaseous gangrene.

Frequently after only twenty-four hours gas is found 10 or 15 cm. from the wound tract and seems to be limited to muscle groups only in so far as the dense fascias are able to resist the progress of the infection. The microscopical sections show most of the edema confined to the space between the areas of Cohnheim and the sarcolemma. The collections of gas are found for the most part between the smaller bundles and spread along the muscle fasciculi. The intensifying of the muscle reds in the gross specimens wherever the infection is in comparative purity, and not due to the lower types of putrifiers, is noted in the stained sections. These brick-red areas of muscle take the eosin stain far stronger than the normal muscle and present the same general color scheme as the gross specimen.

CLASSIFICATION OF WAR WOUNDS

Group I.—Machine gun, rifle, and pistol bullets.

Class A. Wounds that cause death or amputation within forty-eight hours.

Class B. Wounds that cause death or amputation in more than two and less than twenty days.

Class C. Wounds that produce their lesions after the twentieth day.

Group II.—High explosive shell, grenade and aerial bombs, and shrapnel.

Class A. Wounds that cause death or amputation within forty-eight hours.

Class B. Wounds that cause death or amputation in more than two and less than twenty days.

Class C. Wounds that produce their lesions after the 20th day.

Group III.—Bayonet, and trench dagger wounds.

Class A. Immediately fatal wounds.

Class B. Wounds that kill subsequently or are recovered from.

Conclusions.—The special advantage of this method is a serial dis-

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play in three dimensions of the lesions of war wounds that will guide surgical procedure as follows:

(*a*) A demonstration of the extent of damage in tissue due to the different types of missiles which will gage the debridement operation.

(*b*) The foreign bodies and bone fragments are shown in exact relation to the wound tract.

(*c*) The changes in muscle color due to gas gangrene are shown in such a way as to furnish surgeons the criteria to make the decision for or against amputation.

(*d*) The chronological changes of these conditions are shown in such a way as to give the greatest help in the after treatment and reconstruction of war wounds.

(*e*) The microscopical sections give the bacteriologist knowledge as to the avenues and extent of these infections.

Accession No. 4707.

DESCRIPTION OF FIGS. 1, 2, AND 3, GROUP II, CLASS A

Clinical Brief.—This man was hit by a high explosive shell about 8.30 p. m., October 27, 1918, came into Evacuation Hospital No. 6 at 4 a. m. with a diagnosis of G. S. W. right thigh. He was wearing a very tight tourniquet and showed some signs of shock. He was operated after two hours in the shock room at 6 a. m. about twelve hours after the injury.

Gross Description.—Specimen consists of the right knee from the middle of the thigh to the middle of the lower leg. There is a compound comminuted fracture of the femur in the lower, and of the tibia in the upper third. There is a cotton cloth tourniquet just below the line of amputation. The femoral artery and vein are severed at the line of fracture of the femur. A vertical section in the antero-posterior plane shows a piece of shell casing 1×2×5 cm. just under the skin over the patella.

The head of the soleus for 5 cm. downward shows extensive gas gangrene, the muscle tissue showing a marked piting.

Diagnosis: High Explosive Wound. Fracture C.C. of femur and tibia, right, with gas gangrene.

DESCRIPTION OF FIG. 4, GROUP I, CLASS B

THROUGH AND THROUGH M. G. BULLET WOUND, LEFT THIGH, WITH C.C. FRACTURE OF FEMUR AND GAS INFECTION.

Clinical History.—This is an amputation of a thigh, debrided forty-eight hours after a through-and-through machine-gun bullet wound. The amputation was done for gas gangrene three days after the debridement.

Gross Description.—Specimen consists of left thigh amputated at its middle third, with the lower leg cut away 8 cm. below patella. There is a debrided wound of entrance on the inner aspect of the posterior surface of the thigh 4 cm. in diameter, 10 cm. above the internal condyle and 4 cm. internal to the midline. There is a debrided wound of exit 6 cm. in diameter on the outer aspect of the anterior surface of the thigh 6 cm. higher than the wound of entrance. Both wounds are lined by a greyish-green exudate, and bony fragments can be seen in the anterior wound.

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FIG. 1—GROUP 2—CLASS A.—Wound on outer surface of right thigh produced by contact explosion of a 37-mm. shell. Amputated twelve hours after injury without removing tourniquet.

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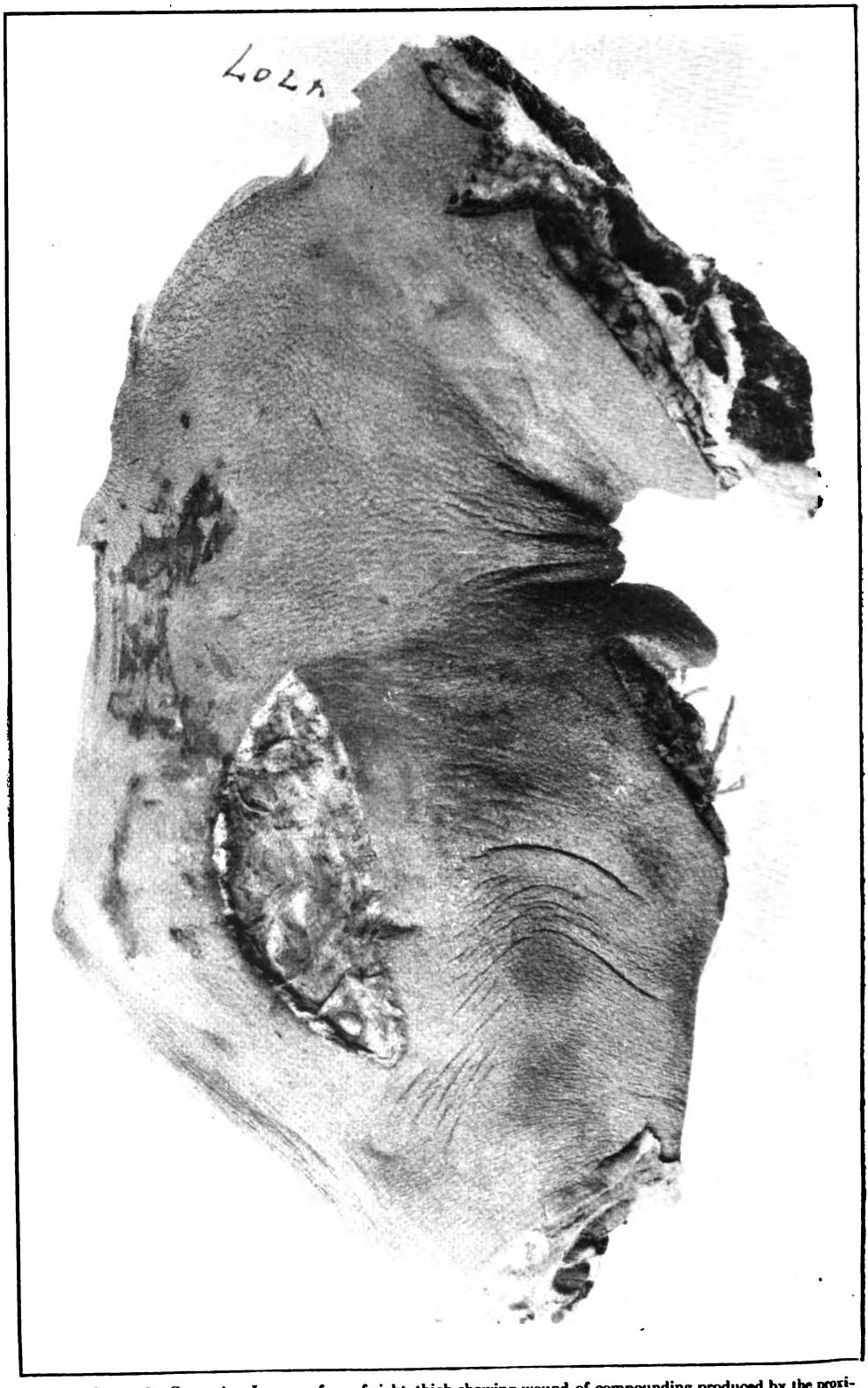

FIG. 2—GROUP 2—CLASS A.—Inner surface of right thigh showing wound of compounding produced by the proximal fragment of the femur.

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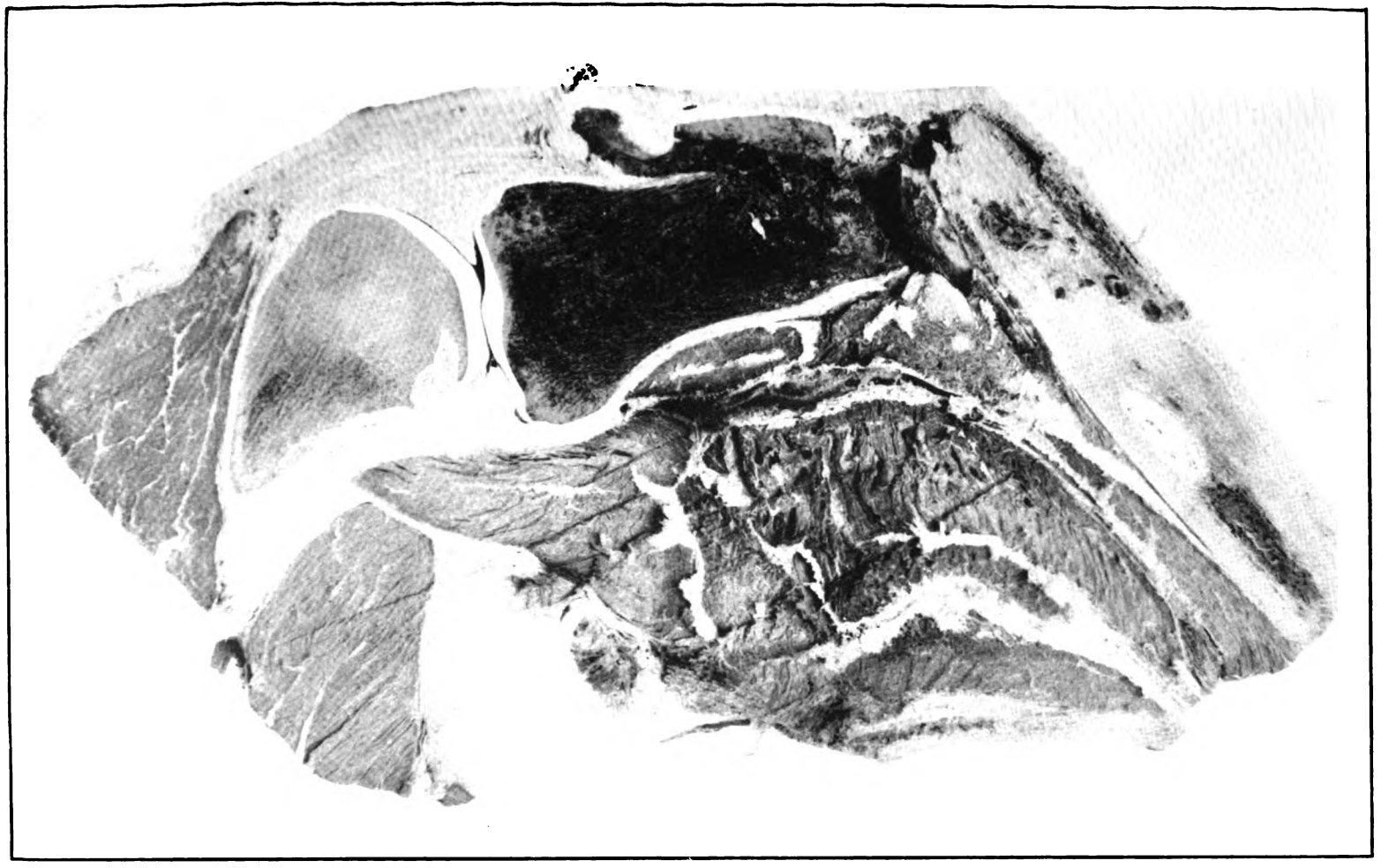

FIG. 3.—GROUP 2.—CLASS A.—Mid-section of right thigh to show a compound fracture of the lower third of the femur with comminution and a gas gangrene of the biceps. There is a hemorrhagic inflammation of the bone marrow.

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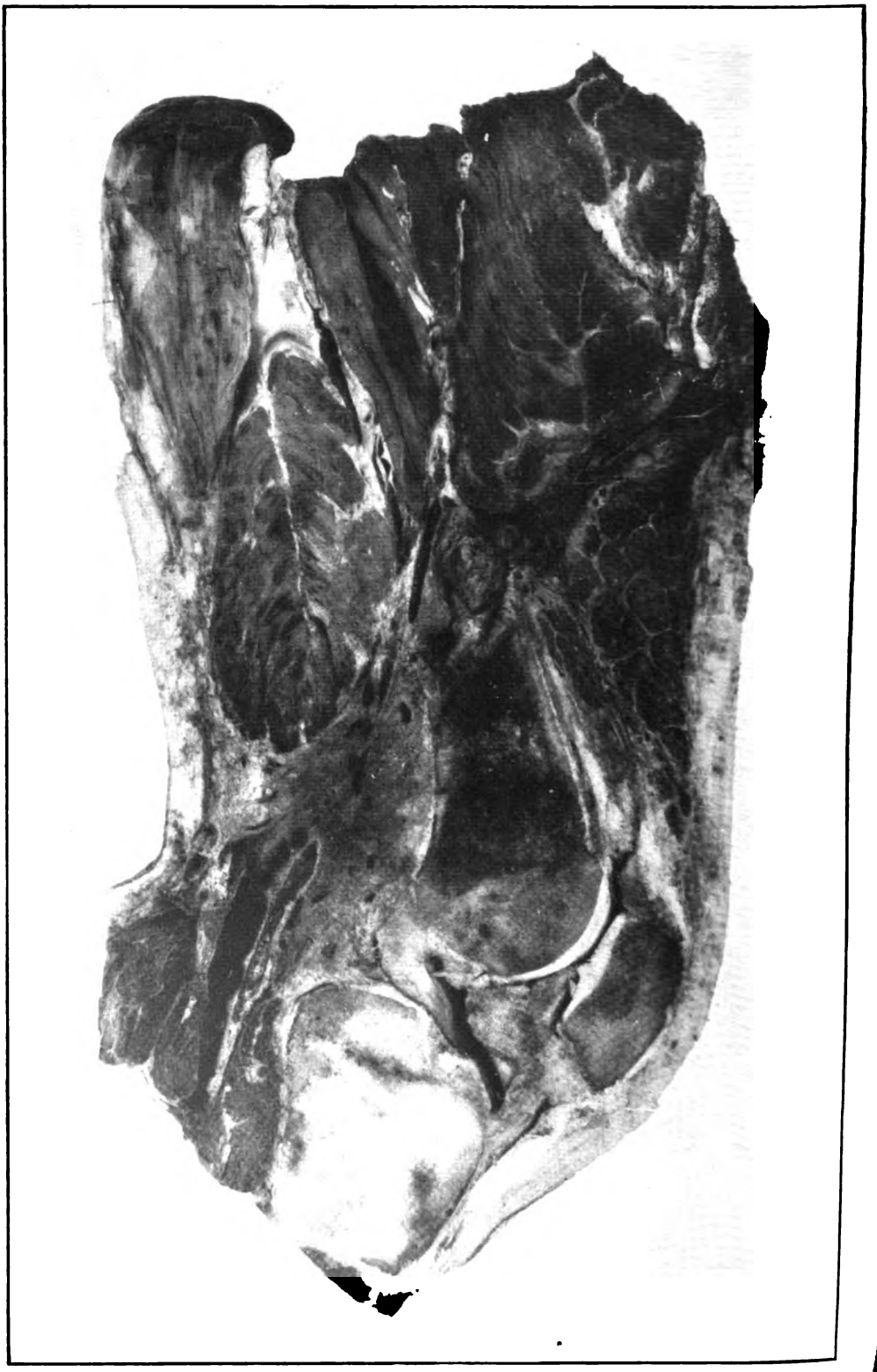

FIG. 4—GROUP 2—CLASS B.—Through and through machine-gun bullet wound with marked emphysematous gangrene of the biceps muscle, a comminuted fracture of the femur and a debrided wound tract infected with the putrefactive bacteria.

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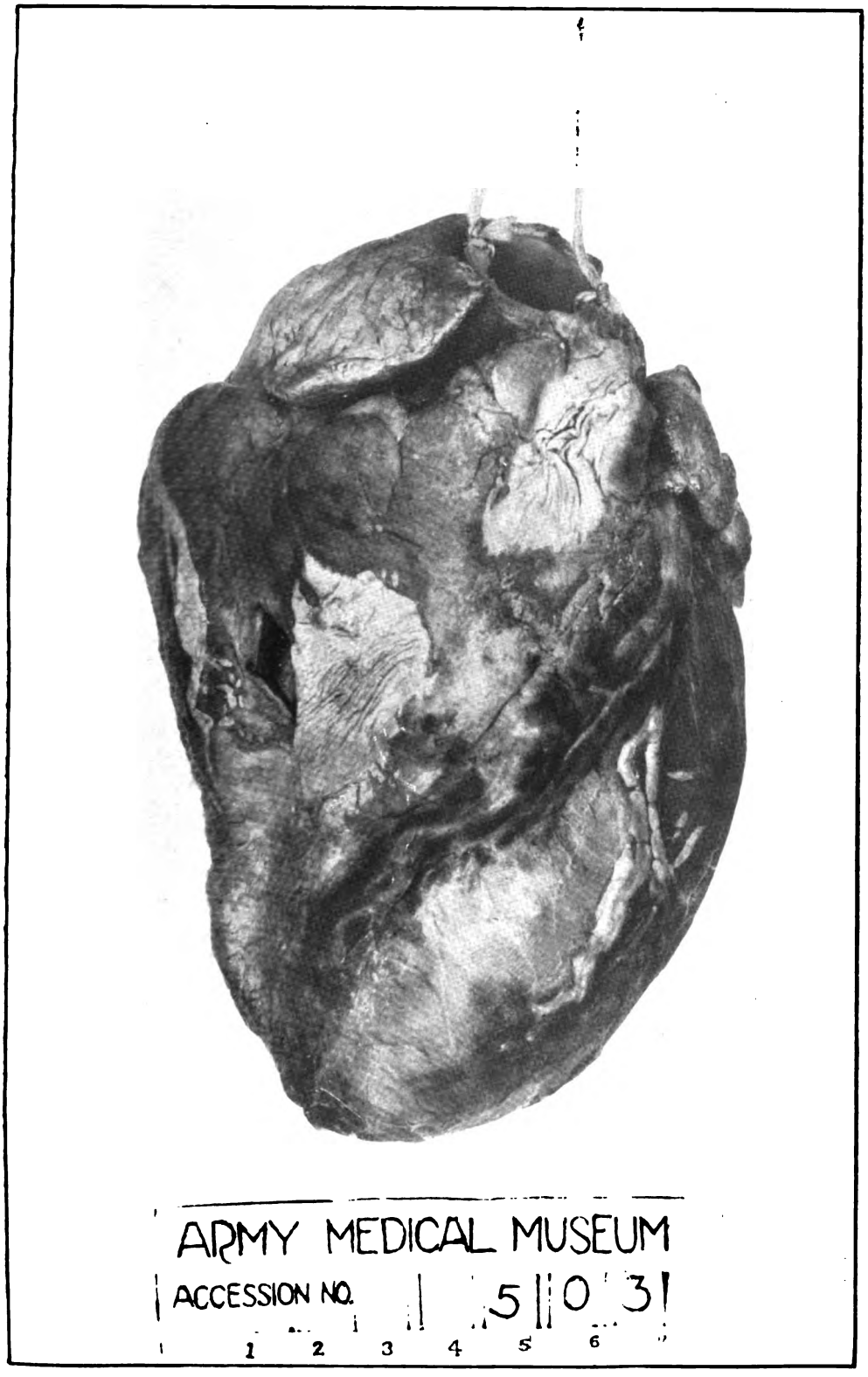

FIG. 5—GROUP 3—CLASS A.—Dagger wound of right ventricle.

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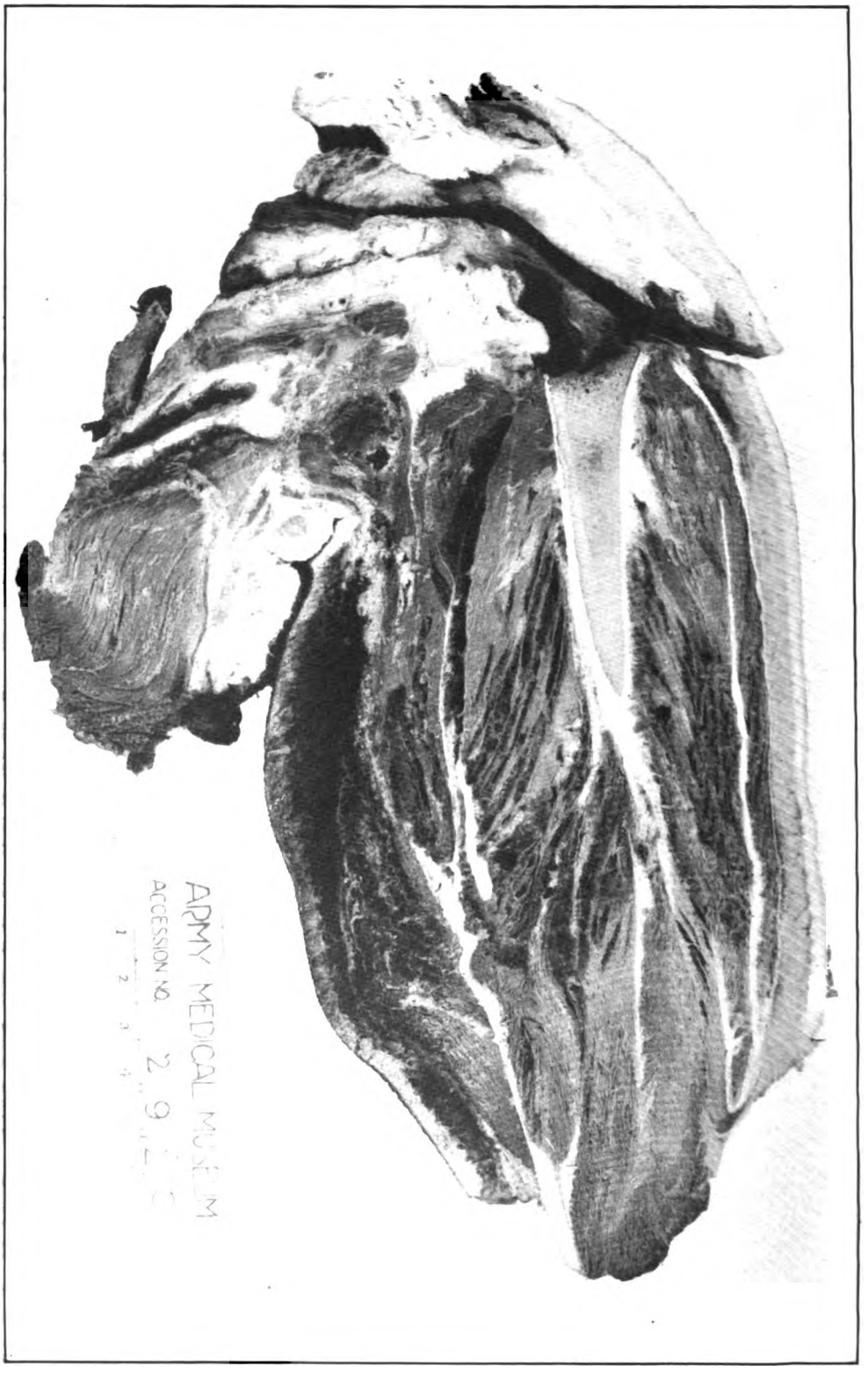

FIG. 8—GROUP 2—CLASS B.—High explosive shell wound of the left knee showing the extreme type of emphysema due to gas gangrene.

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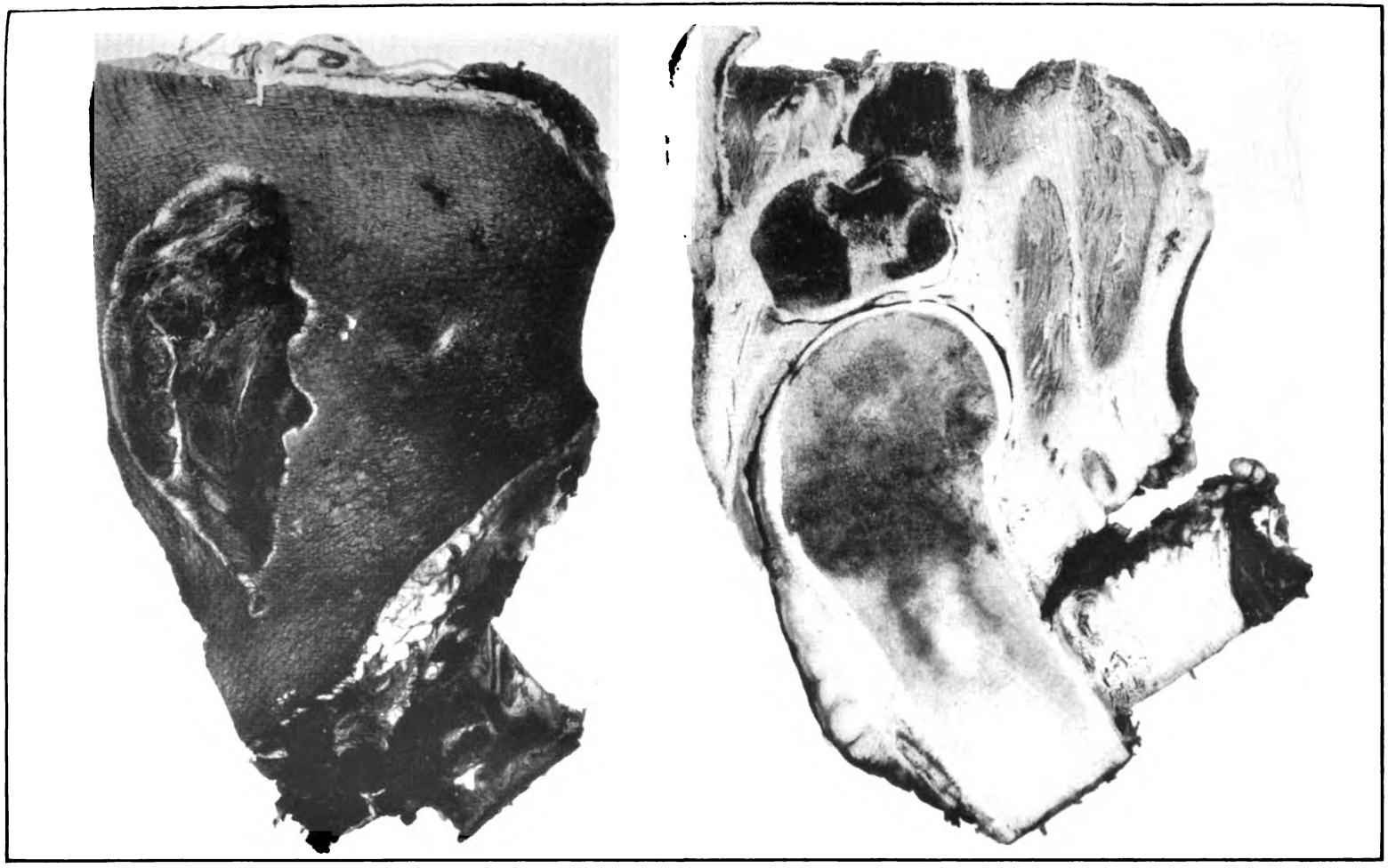

FIG. 9—GROUP 2—CLASS C.—High explosive wound of the right knee showing debrided wound and chronic osteomyelitis of the head of the tibia.

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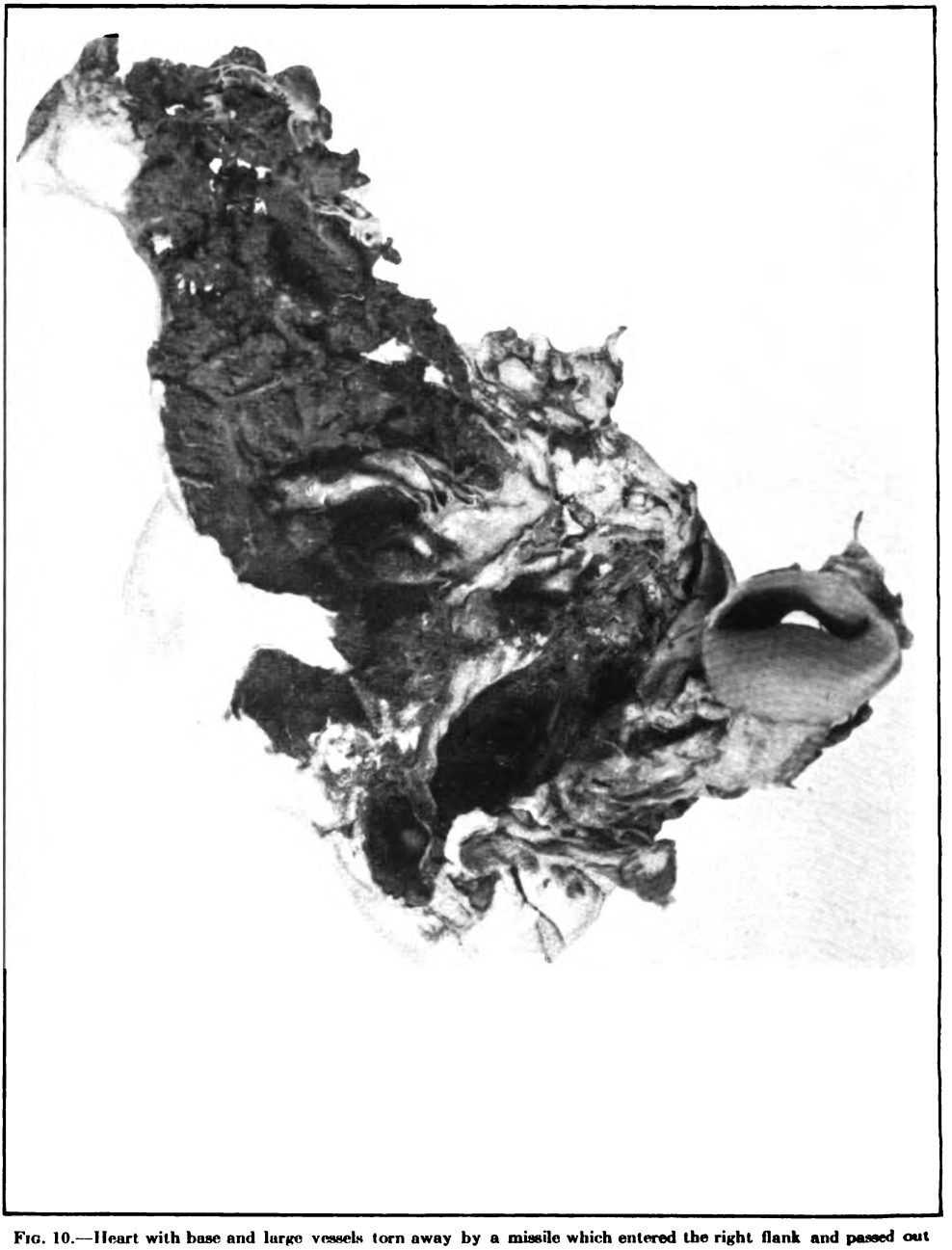

FIG. 10.—Heart with base and large vessels torn away by a missile which entered the right flank and passed out through the left shoulder. Soldier was said to have been thrown 20 feet.

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FIG. 11 (same case as Fig. 10).—Piece of a 210-mm. shell which entered the right flank, passed upward through the liver and out the left shoulder, fracturing the clavicle and first rib. Actual size. Weight, 937 gms. Note the attached piece of uniform on which is a drop of dried mud. This was found inside the soldier's shirt.

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A vertical antero-posterior sawed section in the plane of the wound of exit shows a gangrenous softening of the belly of the biceps muscle, with an extension into the marrow of the lower end of the femur and into the knee joint.

Microscopical Description.—A section from the infected biceps muscle stained with MacCallum's stain shows peripheral liquifaction of the areas of Cohnheim, engor gement of the lymph streams and a large spore-bearing bacillus.

DESCRIPTION OF FIG. 5, GROUP III, CLASS A

Gross Description.—Specimen consists of a heart showing a diamond-shaped stab wound of the right ventricle. There is an irregular milk spot on the right ventricle approximately 2×3 cm. in area. There is a marked dilatation of left coronary. Death occurred in a few moments from hemopericardium.

Accession No. 4711

DESCRIPTION OF FIGS. 6 and 7, GROUP II, CLASS B

Clinical History.—G. S. W. left leg, severe, compound, comminuted fracture both bones with gas gangrene, due to high explosive. Wounded in the Argonne, October 25, 1918, at 2 a.m., died October 28, 1918, from sepsis due to gas gangrene.

Gross Description.—Left leg shows a wound measuring 3×5 cm. at middle of tibia, anterior midline, and a wound measuring 2×3 cm., 2 cm. inferior and 3 cm. posterior to the internal malleolus. The lateral X-ray shows two foreign bodies measuring 1×1½ cm. and 2×2½ cm. posterior to an extremely comminuted fracture of the tibia at the middle third, and an oblique fracture of the fibula at the same level. There are multiple small foreign bodies in the same region and in the region of the os calcis. There is one large foreign body measuring 1½×2½ cm. in the midline just inferior to the posterior margin of the os calcis.

The vertical section through the tibia shows the typical brick red discoloration of the calf muscles due to the gas gangrene group in comparative purity and the darker changes produced by the lower groups of the putrifiers around the wound tract. The tibia shows the typical multiple comminution produced in cortical bone by high explosive fragments, and a well-advanced abscess of the marrow cavity in the procimal end of the fractured tibia.

The section through the fibula shows an oblique fracture of the bone at the middle third and a foreign body measuring 1×1½ cm. embedded posterior to the lower end of the proximal fragment. Above and external to this foreign body and probably produced by the material carried in by it, is a marked fragmentation of the calf muscles caused by the formation of gas in it by the members of the gas gangrene group.

DESCRIPTION OF FIG. 8, GROUP II, CLASS B

Specimen consists of the upper third of the left leg and part of the tissues about the knee from a resection at the knee joint. The muscles of the calf are shredded by an intense gaseous emphysema. The subcutaneous tissues of the calf show a dark discoloration due to the putrefactive members of the gas gangrene group. High explosive shell wound.

DESCRIPTION OF FIG. 9, GROUP II, CLASS C

Specimen consists of a right knee joint with 10 cm. of femur and 15 cm. of the lower leg. There is a debrided wound 7×3 cm. on inner side of patella and one 10×4 cm. on the outer side of leg over the head of the tibia. On resecting back an upper

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flap with the patella attached the exposed joint shows all synovial membranes covered by a purulent exudate. There is a loss of substance with fracture in the head of the tibia measuring 2×3×3 cm., the cavity being lined with a purulent exudate.

DESCRIPTION OF FIGS. 10 AND 11, GROUP II, CLASS A

Specimen consists of a heart and a fragment of 210-mm. shell which entered right flank at McBurney's point through a wound 3×7½ cm., passed to right of cecum without injury to it or rest of intestine through left lobe of liver, through lower lobe of left lung tearing off the base of the heart, fracturing the first left rib, and leaving through a wound 3×7 cm. on the posterior aspect of the left shoulder. The projectile weighs 927 grams and has on the surface that apparently struck the soldier first, a piece of olive drab wool neatly punched out of the overcoat and exactly the size of the impacting surface. Soldier is said to have been thrown some twenty feet from his place as an orderly on a Ford ambulance. There was very little blood on the body or uniform of the deceased. The heart is only intact for 4 cm. up from the apex; the base is a lacerated shredded mass.

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OBSERVATIONS ON THE TREATMENT OF COMPOUND AND COMPOUND COMMINUTED FRACTURES[1]

By Captain JOHN E. WATTENBERG
Medical Corps, United States Army

OF THE great number of men who were wounded in the World War, a considerable number suffered from fractures. Most of these fractures naturally were of the long bones. More generally than is perhaps the case in civil life, these wounds were practically universally badly infected, and often the general health of the patient was seriously impaired, even months after his primary injury. Thus his resistance was low and he often regained his health slowly.

Whether these cases were seen soon after their injury or a considerable time later, no one could help but draw some valuable deductions from the treatment of such cases. Although this series represents, in a fair way, the general nature of all of the fractures taken care of at this hospital, this paper deals only with those who were personally observed and whose records were personally kept. Perhaps the experience would prove most valuable to the industrial surgeon, but sooner or later many of these men will find their way into the different clinics, wherever they may be. Hence the following study may prove of some interest.

There were studied carefully 409 cases of fractures. The ages of these patients ranged from eighteen as the lowest, to forty-three years as the highest. The average age was twenty-five years. They had, with five exceptions, been injured overseas, and an average of 3.6 months has elapsed prior to their entrance into General Hospital No. 26. Although some of the men had regained considerable strength, the average man still looked the "worse for wear" and needed building up generally.

The bones injured were as follows: Humerus, 89; tibia, 72; femur, 46; radius, 44; ulna, 40; fibula, 35; metacarpals, 18; tarsals, 13; scapulae, 11; phalanges, 9; patellae, 8; ribs, 6; vertebrae, 6; astragalus, 6; carpal bones, 4; mandible, 3; os calcis, 3; temporal, 3; sternum, 2; frontal bone, 2; clavicles, 2. Of the cases having several bones broken there were fractures as follows: Number of cases with fracture of tibia and fibula, 25; ulna and radius, 16; femur and tibia, 9; humerus and radius, 5; humerus, radius and ulna, 3.

There were 59 patients who had operations within thirty-six to forty-eight hours after injury and had none subsequently. All others

[1] From the Surgical Service U. S. G. H. No. 26, Fort Des Moines, Iowa, September, 1919.

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were operated upon two or more times, usually for the removal of sequestra, or for pus pockets.

Doubtless a great many of the infected fractures would have required reoperation regardless of how careful one might have been in performing the first operations. Perhaps the main reasons for reoperations were that at first it was difficult to determine just how much removal of bone and soft tissue was really necessary, and so not enough was done at the first operation. A more frequent cause for reoperation was the fact that the wound was not properly sterilized after operation. This requires more patience and greater care than the operation itself. Rocher[2] says healing depends not only upon a perfect and complete operation but also on the "care and vigilance with which the focus is tended until definite healing results." He thinks small bone fractures —for example, of the ulna and fibula—may heal in two months, but that it takes the tibia, humerus and femur three to four months. He calls attention further to the fact that bone tissue is slow to regenerate and has little power of defense against infection. The operation is done once, or should be done once, in the majority of instances, while dressings must be taken care of daily and antiseptics applied correctly several times daily for weeks at a time, and perhaps even months.

There were 22 cases of simple fractures, 154 compound fractures and 233 compound comminuted fracturs. In 41 cases there was loss of bone substance (½ inch to 6 inches). There were 163 instances of osteomyelitis. Though some of these were, of course, slight and resulted only in removal of small spicules of bone at dressings, there were 86 that had sequestrectomies under general anesthesia. Nitrous oxide-oxygen anesthesia was used in all the cases.

The time from the operation for removal of the sequestrum to the healing of the wound, ranged from two weeks as a minimum to seven months as a maximum, with 2.9 months as an average.

The time from the date of injury to the healing of the soft parts ranged from three weeks as shortest, to fourteen months as longest time, with 5.3 months as an average.

Treatment, prior to entering the hospital, ranged from one month to sixteen months, with an average of three and one-half months. Many of the men had been in a number of different hospitals here and abroad. Persistent treatment thus was difficult to carry out, and hence the prolonged convalescence.

There were 19 cases of bone grafting. Two of these had bad post-operative infections, but in this series none of the grafts was a failure.

[2] Rocher, H. L., "Chronic War Osteomyelitis" Archives Medicine et de Pharmacie Militaires Paris, June, 1917, p. 717.

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The time elapsing between the healing of the soft parts and doing the bone graft, ranged from seven days to three months. The average time waited was six weeks. This time depended a good deal on the appearance of the wound and general health of the patient. To operate on the average case in less time than was allowed was found to invite infection, possibly frequently by lighting up the infection still present. This might be explained by the low resistance of the tissues or by the fact that many of the wounds, though healed, still had present living microörganisms. This was demonstrated numerous times by culture of wounds as well as of foreign bodies which had lain imbedded for months but still yielded staphylococcus on culture.

There were 28 cases of plastic operation. These were usually of the nature of skin graft, pedicled flaps, or the skin-slide operations. These were used in cases with extensive scar which refused to cover over satisfactorily with skin, or in cases where denuded bone was present. The skin-slide operation was done to fill in deep bony cavities which it was impossible to cover with skin in any other way. This was done by the turning of a narrow pedicle with a broad base, into a deep bony cavity, fixing the tip of the pedicle into the deepest portion of the cavity by either a suture, or, in other cases, by merely the use of a tack. There were two such instances of the sternum, and two of the ilium. When healed, this left, instead of the wound, a depressed area which was covered over with skin.

Internal fixation with wire or metal plate had been done prior to admission in 7 cases. Four of these had subsequent sequestrectomies. There was no operation for internal fixation with metal done at this hospital in the series studied.

In several instances of fracture at or near a joint the healed wound resulted in a joint in mal position. This was remedied under an anesthetic and usually followed by a cast or other external appliance. In the series observed there were 11 such cases of forcible correction.

As is usual, the nerve adjacent to a fracture was often injured. There were 111 nerve injuries. The musculo-spiral was injured in 43 cases; the ulna, 20; anterior tibial, 19; median, 15; larger cutaneous branches enough to produce areas of anesthesia of considerable extent, 5 cases; auxillary, 4; intercostals, 2; posterior tibial, 1; sciatic, 1; spinal accessory, 1. Twenty-seven cases were operated for their nerve condition, while 29 had sufficient signs of return of function so as not to necessitate interference. Others will doubtless require operation while still others will perhaps regain function without it.

In the observation of a considerable number of patients one is struck by the fact that there was seldom a patient who had had fewer than

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three operations. This is of course accounted for mainly by the presence of the pus-producing organisms or the presence of foreign bodies, or both. This results not so much from the re-formation of new foci of infection nor from re-formation of sequestra, but rather from not being thorough enough in the removal of infected material and dead bone in the first place.

The treatment of these wounds has been in the main rather uniform. It consisted of the removal of the foreign body and removal of the devitalized tissue by excision. This was followed by an attempt to sterilize the wounds with antiseptics. Metcalf [3] in his summary of treatment of these conditions names "adequate debridement" as the first operative measure. This procedure was advocated by Dr. M. B. Tinker [4] in 1909. It required war-time surgery, however, to popularize it. In the latter paper the author suggested protection of the open wound by packing it with tampons of sterile cotton, or gauze saturated with sterilized oil, and the preparation of the skin about the wound for an aseptic operation. He then carefully swabbed the lacerated tissues with a powerful germicide. Following this he advised the excision of the tissues damaged by injury or germicide, finally "closing the wound without drainage usually, there being only healthy tissue of good vitality."

If in the cases requiring sequestrectomy "wide excavation" is done thoroughly, the wound left open and antiseptics properly applied, re-operations should not be so numerous. The total number of operations done on these patients is 1,018. This is a large number when it is considered that 11 cases had no operations at all and 59 had only a primary operation. And among these operations counted are not numbered the nerve operations nor the operations done for the removal of foreign bodies. The large majority of these re-operations were sequestrectomies. Leriche and Policard [5] call attention to the fact that "the white denuded bone in a war wound is actually dead and as much a foreign body as an engrafted segment of bone." "All this material must be removed, for it obstructs the Haversian canals, and when that is the case, normal repair is hampered."

There seems to be quite universal agreement on the necessity of sterilization of these wounds. As to the choice of antiseptic to be used there is considerable difference. Decomps and Richard [6] use 10

[3] Metcalf, C. R., "Fracture of the Femur; the Application of War Lessons to Civil Practice." *Ann. of Surg.*, November, 1919, lxx 603.

[4] Tinker, M. B., "Radical Conservatism in the Treatment of Compound Fractures." *New York State Journal*, May, 1909.

[5] Leriche and Policard, "Dead Bone in Case of Fractures." *Presse Medicale*, Paris, September 19, 1918.

[6] DeComps and Richard, "Ether Dressings." *Paris Medical*, September 21, 1918, p. 229

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to 40 c.c. of ether in their infected wounds three times a day and thus "prepare them for secondary closure." Morison [7] illustrates by charts the relative germicidal effects of Carrel-Dakin solution, flavine, dichloramine-T, hypertonic salt solution and Bipp (bismuth subnitrate, iodoform and liquid paraffine), "proving that Bipp is the most active germicide." Leibinger [8] also claims excellent results for Bipp and many others have found it efficient as an antiseptic. Many other antiseptics have been employed and good results reported from their use. Perhaps the choice of the antiseptic is not as important as the persistent care with which the chosen antiseptic is used. Dunham [9] has studied the different antiseptic agents exhaustively. It was his conclusion that the "chlorine group of antiseptics offer better promise of completely meeting the requirements than any other substances." Of the latter Dakin's solution and dichloramine-T were employed in all of our cases and gave satisfactory results. Dichloramine-T was used principally in sinuses and surface wounds.

Dakin's solution, when used in these wounds, is a great time saver as well as a life saver. If the vessels that are cut at operation are properly ligated, Dakin's solution can be begun on the same day of operation. It is not necessary to wait a day or two. This is merely a loss of time to the patient, both by permitting new bacteria to grow as well as by not getting rid of those present. Chutro [10] has pointed out that delay in using antiseptics after operation has the further disadvantage of permitting clots to form. Beneath these, bacteria find a place which is often not reached by the antiseptic, although the surface of the clot may be sterilized. The author points out that the clot may not be dislodged for a week, giving the bacteria, in the meantime, a chance to grow. Failure to sterilize such a wound is usually due to improper use of the antiseptic. The entire surface of the wound must be thoroughly bathed by the antiseptic, and this must be done often enough so as not to permit the bacteria to gain in number nor even remain at a standstill—they must persistently diminish in number. This cannot be determined with any reasonable degree of accuracy unless cultures are made and numbers of bacteria counted. This should be done twice a week routinely, taking the loopful of pus from the most suspicious area of the wound each time. Frequently, when

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[7] Morison, J. R., "Some Points in War Surgery." *Surg. Gyn. and Obs.*, October, 1919, xxix 348.

[8] Leibinger, H. R., "Compound Fractures Treated by Bismuth Iodoform Paste." *Mich. State Med. Soc. Journal*, December, 1917, xvi 489.

[9] Dunham, E. K., "An Application to Empyema of the Principles Underlying the Use of Antiseptics." *Ann. of Surg.*, August, 1918, xvii 148.

[10] Chutro, Pedro, "Bone Fistulas after War Wounds." *Jour. Am. Med. Assn.*, Septembe 1919, lxxii 751

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this is done, errors of technique in the treatment and dressings are discovered early and can be remedied. If the degree of sterility or infection, as the case may be, is left to the judgment of the naked eye, the error may in time be discovered, but only after having been many times repeated and much time lost. Guillot and Woimant [11] say that 50 per cent of the men with fracture of the femur still have a fistula a year after the fracture unless amputated. Using Dakin's solution their "cures were complete" in an average of twenty-six days. In fracture cases cultures have the farther advantage often, of raising the suspicion of infected cartilages. As Moschowitz [12] has pointed out, infected cartilages must be entirely removed. Care must be exercised to heal the wound from within. It is safer to let the skin and soft parts retract, even though a skin graft later might be necessitated by it, than to permit the wound to close externally with opportunities for the formation of pockets to harbor bacteria. Buchbinder,[13] realizing the importance of keeping the wound patent until sterilized, advises cutting across the muscle tissues to facilitate their retraction, thus assuring patency of the wound for effective sterilization. The men had been obliged to shift from one hospital to another rather frequently and thus could not possibly get their necessary care. They were often admitted with perhaps one Carrel tube, closely hugged by scar tissue external-ward, but leading down to a pocket of pus of several ounces' capacity beneath. Such was the condition in the majority of instances where re-operations were found necessary. The open wound should have in it a sufficient number of Carrel tubes to permit bathing the entire wound. Gauze may be packed into the wound loosely, both to help in applying the antiseptic as well as to help hold the tubes in place. If the wound has been sterile for a week by daily count, it may have secondary closure or one may continue sterile dry dressings and let it close of its own accord.

Unfortunately only about one-half of these cases could be observed to the end of their convalescence. In these the results were substantially the same as found by the Committee on Fractures of the American Surgical Association.[14] Their observations were made on 1,745 fracture cases. They found that for compound fracture the period of disability for the femur was 13 months, of the leg 6 months, and the upper extremity 4 months.

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[11] Guillot and Woimant, "Suture of Old Infected War Fractures." *Journal de Chirurgie*, Paris, February, 1918, xiv 3.

[12] Moschowitz, A. V., 'The Treatment of Diseases of the Costal Cartilages." *Ann. of Surg.*, August, 1918, xviii 168.

[13] Buchbinder, J. R., "Gunshot Fractures of the Femur." *Surg. Gyn. and Obs.*, July, 1919, xxix 70.

[14] Estes, W. L. *et al.*, "Committee on Fractures of the American Surgical Association. Results obtainable in the Treatment of Fractures." *Ann. of Surg.*, August, 1918, lxviii 238.

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THE STRATEGY OF THE MEDICAL SERVICE

By GUSTAVUS M. BLECH

(With 3 illustrations)

I. GENERAL REMARKS

"Strategy is a system of accommodations, the translation of knowledge into practical life."—*Moltke.*

WE HAVE just gone through the greatest war in American history. Never before has there been such a vast mobilization of medical men, more than one-third of the entire medical profession of the United States having served under the colors.

In spite of the bigness of the war numerically, it is believed that one can hardly refer to the medical officers as a class, as graduates of the greatest military school that ever was or will be—war.

The reason is to be found in the rapidity of the mobilization, in the short duration of the war, as far as actual campaigning is concerned, and, lastly, in the simplicity of the problems presented at the last period of a position or trench war.

But an unprecedented interest in things medico-military has been aroused even among medical officers of the Army who have filled professional positions merely, and it is hoped that this article will cause many younger confrères to maintain an interest in preparedness for possible field service either in maneuvers or in another test for our national security.

Strategy of the medical service is part of the strategy of an army in combat, with this difference, that while combat strategy plans and fixes position (selection of terrain) and method of attack or defense, medical strategy has only discretionary range within the frame of the combat strategy.

In other words, the selection of positions for and the manner of function of the sanitary units and formations of an army in the field is subordinate to the positions and functions of the combatant forces.

The combatant forces have one great aim—victory over the enemy. The medical service has one and one aim only—that of the combatant forces.

The combatant forces attain victory by overcoming the resistance of the enemy culminating in the gain of terrain; the sanitary forces *assist* in the attainment of victory through:

1. Moral support (the combatants know that professional care is at their disposal in the event of casualty).

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2. Economic support (combatants are not interrupted in their work through the need of looking after fallen comrades).

3. Human salvage (the firing line is maintained in its integrity through the rapid return of soldiers placed hors de combat).

The function of the medical service in the field, therefore, is of a twofold character:

1. To give professional care to all sick, wounded and disabled for the purpose of saving as many as possible for further duty at the front.

2. To care for all who cannot so be saved through an organized and humane transport to the rear.

Simple as this sounds, the execution of the duties of the medical service in the field may be fraught with many difficulties and complications with which only one familiar with all contingencies of battle can cope with intelligence.

And therein lies the difference between the work of the civilian practitioner and the medical officer at the front.

The civilian cares for one or a few under fixed conditions (home, ambulance or vehicle, hospital); the military surgeon has to care for many under varying conditions, each fraught with certain problems.

These problems are produced by the battle situation, by the terrain, by the character of the defense or attack of the enemy, and by the organization and equipment at the disposal of the medical service.

Modern battles terminate in victory in which case terrain is gained resulting in a forward movement of the army; or the decision is uncertain and unimportant, resulting in neither lasting gain nor loss of terrain (position war, trench warfare), or else the battle terminates in temporary or permanent defeat and terrain is lost, resulting in a movement to the rear.

From this it follows that for all decisive actions mobility of the troops is of prime importance, either for the purpose of clinching the benefits of a victory (occupation of enemy terrain, demoralization of the enemy's retreat through adequate pursuit) or of minimizing the effects of a defeat (escape from capture, organized retreat with rear-guard action to save as much terrain as possible and to preserve morale for further resistance in a more suitable terrain or with fresh forces).

The entire equipment of line troops (infantry, cavalry, field artillery) has been devised to insure mobility, soldiers taking with them in the field only what they can carry. Heavier equipment necessary at the front is moved in motor trucks or drawn by animals (cannons).

At that, a defeated force will lose valuable ammunition and supplies, which, by the way, are usually destroyed in order to minimize the material gain of the victorious opponent.

The medical service works or should work, with similar field equip-

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ment. How far this proves effective we shall see later on. But that service has a problem of mobility with which the line troops do not have to reckon.

Assuming for the sake of argument that the medical branch of the army in the field could be so equipped as to match in mobility the line troops, the very nature of that service makes mobility, at least in its entirety, impossible, since we have to deal with a human burden which should not be moved—the gravely sick and wounded whose condition absolutely forbids transport.

Sanitary formations of an army or smaller combatant unit are part of the army or unit. To serve effectively they must remain with the line troops, that is to say, they must maintain contact with the combatant forces in advances or retreats. The maintenance of such contact by the diverse frontal medical units and formations, under all conditions incident to the fortunes of war, is a service which can rightly be called "strategy of the medical service."

II. OUR MEDICAL SERVICE BEFORE THE WORLD WAR

Before we can intelligently discuss the strategic problems of the medical service of our Army, it is essential to know something of its history.

Our medical service, as understood by modern armies, can be said to have had its beginning in the Civil War through the efforts of the Medical Director of the Army of the Potomac, Jonathan Letterman, who developed the idea of ambulance companies, organized on a plan effectively to convey the wounded from the battle field proper to the diverse formations for the aid of the wounded, located in the rear.

There is evidence in the German medico-military literature that Letterman's ideas have been appreciated by the Prussian and confederated German armies in 1870–1, in the war with France to a full extent, though the first application of the principles involved was experimented with in 1866 in the war against Austria.

In our Spanish-American War we had no ambulance companies, as constituted today, and certainly no field hospitals, as we understand today, at least not units which have been organized, equipped and trained for service as ambulance companies and field hospitals before or immediately after the outbreak of the war. What service of either character was rendered on Cuban soil was improvised, by detail!

Since that war we underwent a period of theoretic or rather scientific renaissance. Our little regular army began to think of the time when our nation might have to face a militarily more important enemy than we confronted in Cuba, with the result that, after a thorough study of the

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systems of sanitary service adopted by the leading foreign armies, a definite scheme of organization was outlined. This consists of regimental medical officers and enlisted medical detachments, four field hospitals and four ambulance companies for each division. These units have been established in peace for existing divisions organized or tentatively organized in the Regular Army and National Guard. Provision was made for two evacuation hospitals for each division in the event of war. Occasionally one could see an evacuation hospital pitched. Aside from larger size and more complete equipment it differed little from the field hospitals.

The organization of line of communication formations and especially base hospitals does not come within the scope of this article.

Two books must be mentioned as priceless possessions of that period of organization, namely, (1) Straub, "Medical Service in Campaign." Published by P. Blakiston's Son & Co., Philadelphia. (2) A Study in Troop Leading and Management of the Sanitary Service in War by Morrison and Munson. Published by the Army Service Schools, Fort Leavenworth, Kansas.

Both books, which are obtainable at little expense, remain to this day and in spite of the experience of the World War, standard textbooks, the former outlining our entire pre-war sanitary service in the field in minute detail, the latter showing the function of the service in an imaginary war fought in the United States.

It is earnestly suggested that all interested who have not yet done so, and who are patriotic enough to be identified with the military services on the active or inactive lists, study these works at their leisure.

III. IMPORTANCE OF MILITARY ORGANIZATION

"In war everything is subservient to organization."—*Pirogoff.*

The great Russian surgeon, doubtless one of the greatest minds of his era, whose dictum we have selected as the motto of this section, has realized the importance of military organization in war as compared with the civil practice of surgery. Von Bergmann, the great Russo-German surgeon, goes a step farther and demands that all individualization, the pride of scientific surgery in peace, be sacrificed in campaign to pattern-like work. What he demands amounts to no more and no less than the adaptation of all surgical activities to strategic conditions. This particular part of our work belongs to the domain of military surgery in the field and can be touched here no further.

But though the expressions of both leaders in military surgery have come to be accepted as axioms, we have had a number of wars fought with modern firearms and weapons, which afford convincing proof that

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inadequate organization of the medical service of an army is one of the principal defects penalized by defeat.

The Russo-Japanese War (1904-5) and the Balkan War (1912-13) prove this conclusively.

It will be worth our while to review some of the features of these wars, as regards the medical services of the nations concerned.

In Russia medical officers are neither military officers nor civil officials, externally characterized by "abbreviated" military epaulets. Col. Valery Havard, M. C., U. S. Army, who was officially attached to the Russian army in Manchuria as a military observer from December 7, 1904, until March 10, 1905, when he was captured by the Japanese in the battle of Mukden, in his report says:

> The Russian medical department does not yet possess complete autonomy, and it seems difficult, in high places, to get rid of the idea that, being a professional body, it is incapable of governing itself. . . . Transport columns, sanitary trains, the service of evacuation are still in charge of line officers. I believe that this war will tend to show the great evils of divided responsibility. . . .
>
> Bearers do not form part of the regular medical personnel, and probably are always an uncertain quantity. . . They . . . give first aid to the wounded, so far as practicable, and bring them to the dressing station (under command of a line officer: G. M. B.). . . a majority of the wounded would still find their way to the dressing station on foot, helping each other or helped by sound comrades who left the ranks for the purpose.

Though the regulations of the Russian Army provided ample medical service something went wrong:

> It is possible that the field hospitals "at large" were not mobilized or sent to the right places, thus reducing the divisional strength of the hospital corps by 222 men. It is also probable that all the regimental bearers were not turned out . . . and all these possible irregularities were certainly accentuated in the medical work of the front by the lack of authority and, therefore, the sense of irresponsibility of military doctors who are not officers, as well as by the lack of experience in field work of a majority of them, namely, those coming from the reserve.
>
> At the dressing stations I visited I noticed a general laxity of discipline and want of organization, as if nobody was in command and responsible. . . .
>
> In the Harbin hospitals I saw patients who had between one and two weeks without medical attendance (at the front G. M. B.). . . .
>
> As to the means of transport from dressing stations to field hospitals, they were woefully lacking and defective. There were few available stretchers and no ambulances.
>
> During the various engagements of the battle of Mukden the bearer companies and transport columns which came under my observation appeared to me strangely careless and inactive.

Colonel Havard narrates that while the Mukden fight was going on all along the line he saw bearer companies halting and resting and the best equipped transport column he had seen lying idle in camp, and rightly expresses his belief "that this want of diligence and activity, be-

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traying incompetency and defective organization, is chargeable to the line officers who are in command of the means of transport."

In an article published in the May, 1912, issue of THE MILITARY SURGEON the author,[1] speaking of the failure of the now famous Mishchenko raid, said:

> Now came something noteworthy: Kuropatkin had advised the use of horse-drawn wagons on two wheels, the horses to be selected with care. He had written: "These wagons will not fall behind the command and when freed from their loads will constitute your sanitary transport." But Mishchenko did not heed the advice of his superior—at a price, as will be seen, dear enough. . . .
>
> Toward morning the order came to place all the wounded . . . on stretchers and Chinese carts, and to start back, so as not to hamper the column, for the commanding general had received disquieting reports of a planned advance by the enemy. The number of stretchers was extremely limited and Chinese carts fewer still. Now began a search for carts, overcoats and blankets. . . . Under such horrible conditions the retreat began. The suffering of the gravely wounded on the carts defies description. Many begged the surgeon to shoot or poison them. . . . Morphine and opium were given freely, but to no purpose.

In a personal communication to the author a distinguished observer expresses himself about this cavalry "raid" in these words:

> The failure of the raid was largely due to failure to supply adequate transport or wounded. This resulted in the use of Chinese carts which delayed movement so much that whatever chance there might have been was destroyed.

Were it possible to quote from the numerous official, semi-official, and private publications by Russian medical officers, it could be shown that all are agreed on the following propositions:

> 1. The Russian medical corps is controlled by high ranking line and staff officers who have moved about field hospitals in a senseless and purposeless manner merely to show that they were not idle, with the result that in some places where most needed there were none functioning, thereby creating unnecessary suffering.
>
> 2. That the morale of the Russian troops was shaken through lack of medical organization, the lines becoming depleted through healthy combatants acting as "guides" and "supporters" of wounded comrades, while those who could not so get away dreaded injury in the knowledge that they would have to drag themselves for many a mile until they would find shelter, a glass of hot tea, and professional care.

Troops so demoralized do not fight well. The lessons are obvious. Contrast with the above what we learn about the Japanese medical service.

In a monumental report of an exhaustive character, Col. Charles Lynch, though acknowledged one of the most conservative officers of our regular army medical corps, has this to say:

> . . . it should be stated that administrative officers of the medical department generally were in close relation to their commanding officers; their control of their own department was complete.

[1] "The Russian Army Medical Service in Manchuria—A Critical Review of Some of its Phases," by Gustavus M. Blech.

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. . . Officers generally in Japan are informed on the importance of the medical department as a part of the body military and its true functions with an army. . . .

. . . Due weight appears to be given also to the opinion of medical officers on any contemplated movement of troops, of which they are informed and for which they take part in conference.

. . . Any friction between officers of different branches of the service would be entirely contrary to Japanese ideas of patriotism, and all officers work harmoniously in the grooves fixed for them by regulations. . . .

Speaking of the Battle of Mukden, the medical conduct of which has aroused bitter criticism by Colonel Havard for the Russian service, Colonel Lynch, who devotes a large chapter to the details of this important conflict, remarks:

The medical department, according to regulations, had full information on contemplated movements leading up to the battle, and therefore was able to make complete preliminary arrangements for its own work. . . .

. . . The Sanitary Reserve Personnel, the field hospitals, and the sanitary companies each had about five times the regulation amount of supplies.

Colonel Lynch goes on to show that transportation was increased and coolies to litter the patients were freely hired. The activities of the diverse sanitary units and formations, though not perfect in professional details, were functioning wherever placed, many running smoothly. This is also apparent from a large map showing the actual positions of the sanitary units on the arena south of Mukden.

Of course the excellence of the Japanese medical arrangements was not the sole reason of success, but it certainly still more enhanced the fighting courage of a patriotic army, imbued by patriotic ideals.

Russia was primarily a military power. It had the largest regular army in the world. Well may it be considered that for Russia the war in Manchuria meant only a colonial war, the reason for which did not enthuse the majority, while Japan was fighting for ideals. It cannot be denied that both arguments carry weight. On the other hand, even the most enthusiastic soldiers will not endure long if they are not well fed, shod, clothed, sheltered and taken care of when wounded. Morale must be sustained by proper organization.

Similar conditions are encountered in a study of the Balkan War. When one considers that Bulgaria, Servia, and Greece have hated and fought each other for a long time and suddenly sprung a surprise on Europe by a coalition to throw off the yoke of Constantinople by the combined force of arms, the "ideal" was on the side of the Christian nations. But the Osmanic army had war experience, had but recently received military "retouching" by Freiherr von der Goltz, and above all the Mussulman is or rather has been notorious as a professional fighter.

There were errors by the Turkish war office. Mobilization, to offset

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the well-planned mobilization and war feints of the Bulgaro-Servians, had to be rapid to make up for neglect. The medical arrangements were highly unsatisfactory, as was the supply of ammunition and food. Not until the Turks had concentrated on the so-called Chatalcha line was their organization worthy of a name.

Mahmud Mukhtar Pasha, commander of the II East Army, wrote an interesting book on his leadership in that war. He blames the poor organization and general demoralization of the officers corps and of the nation for the defeat. He says nothing about the medical arrangements, but he himself was wounded and left to his fate on the field until an orderly dragged him away.

Compare with this Corrado Zoli's statement that the care of the wounded Bulgarians became a service of love to which everybody contributed everything possible. While the medical service was not ideal, the soldiers felt they would be looked after, if wounded, and did not worry. The Turkish army had an adequate number of field hospitals, but the transport service between the firing line and these formations had broken down because it was neither adequately provided for nor well organized and disciplined.

These samples will suffice, it is believed, to show that an army without a well-organized medical service is unthinkable as a fighting force.

IV. LESSONS OF THE WORLD WAR

As has been alluded to, the World War as a school of medical strategy has been something of a disappointment. We began with a position war on a terrain previously held by our allies. Most regimental aid posts, dressing stations and field hospitals had been established by the French, so that all we had to do was to take over their positions.

Fortunately for us we had no retreats, at least not in a strategic sense, so that the tactics of our medical formations were very simple and, accordingly, easy of execution.

We learned something as regards the inadequacy of our field hospitals. We had, of course, here and there, field hospital personnel close to the front established in permanent buildings, functioning as evacuation hospitals, some even having female nurses on duty, and we increased the personnel and equipment by so-called mobile operating units to augment the surgical facilities of the field hospitals.

As regards service at the British front, our field hospitals and ambulance companies had to undergo a temporary modification to harmonize with the English "field ambulances," which represent an American field hospital and ambulance company combined.

The advantage of such a scheme is not apparent. Certainly our field hospitals as constituted before the war are an anachronism.

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That other civilized armies still continue to maintain them is a fact, but the time for us to follow others and accept foreign teachings as authoritative has gone by. Our regular army medical corps has not only "graduated" but can now assume the rôle of international teachers and, we feel confident, will in the near future recommend changes in our organization and equipment which will increase the usefulness of the medical service at the front.

We can safely maintain that with the exception of the use of extension splints on the firing line and the value of "surgical sterilization" (*débridement*) of gunshot wounds within a few hours after the receipt of injury, nothing especially new has been brought out by the World War.

Perhaps, after all statistical data shall have been tabulated and weighed, it will be found that, under favorable conditions, conservatism in the treatment of many wounds need no longer be adhered to, but on the whole the rules concerning the transport of wounded, that is to say the transportability of soldiers suffering from certain war injuries and the nontransportability of others have hardly been changed, except that with the extension splints properly applied transport even over comparatively long distances is fairly safe, as far as all compound, comminuted fractures of the extremities are concerned.

We are, however, not likely to fight another war under conditions such as we encountered in France, and in planning our future activities preparatory to another conflict all possibilities should be borne in mind.

An attempt will be made to show that an organization can be established, elastic enough to meet any and all contingencies.

V. ORGANIZATION OF THE MEDICAL SERVICE OF AN INFANTRY DIVISION

The division representing the great administrative and tactical unit organized to maintain itself in any action, we must glance at that machine before deciding what its medical service should be.

It cannot be our intention to prescribe what a division is to consist of with reference to the line troops, technical troops and staff corps, but we are able to appreciate the fact that the organization of our infantry divisions soon after their mobilization for the World War was too large.

This is evidenced by a new organization prescribed for in 1918. Even under that table one cannot but realize that certain sections were top heavy and the entire organization, though better balanced, still far from being easily controlled by divisional headquarters.

The French divisions, for example, seldom exceeded 15,000 officers and men as compared with our 33,000 and later 28,000 (approximately).

It is probably safe to assume that in future wars our divisions will have a strength of from 20,000 to 25,000 officers and men. This uncer-

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tainty, however, does not influence our calculations with reference to the medical service to an appreciable degree.

An infantry division will consist of headquarters, 1 headquarters troop of mounted infantry and 2 companies signal corps attached, 1 regiment of engineers, 3 regiments of light and heavy field artillery, 4 regiments of infantry, 1 machine-gun battalion, 1 ammunition and supply train with a company of military police.

The medical personnel and units and their duties, briefly, should be:

1. *Headquarters.*

1 Division Surgeon (chief of the entire medical service of the division. Medical strategist on the staff of the Commanding General. Responsible for the organization, equipment and training of every medical officer and unit attached to the division. C. O. of Sanitary train.)
1 Asst. Division Surgeon (Sanitary Inspection. Adjutant of the Div. Surgeon in battle.)
1 Med-Supply Officer (San. C. Med. supplies).
Professional consulting staff (Surgeon Alienist, etc.), 4 medical officers.
1 Division Laboratory Chief (Water analysis, disinfection, epidemiologist.)
1 Junior Medical officer (surgeon for headquarters, Hq. troop and signal battalion.)

Total commissioned M. C.. 8
Total commissioned San. C., 1.

Regimental and Battalion Surgeons:

4 regiments infantry	at 6 =	24
3 regiments artillery	at 4 =	12
1 regiment engineers	at 3 =	3
1 machine-gun battalion	at 2 =	2
1 ammunition train	at 2 =	2
1 supply train	at 1 =	1
1 military police	at 1 =	1
Total commissioned M. C.		45

Medical Units:

Ambulance Battalion.

4 ambulance companies	at 5 =	20	
1 C. O. of Battalion		1	
Total commissioned M. C.		21	
1 Adjutant (San. Corps)		1	Total commissioned San. C. 1
1 Mobile field hospital	at 6 =	6	Total commissioned M. C. 6
1 Adjutant (San. Corps)		1	Total commissioned San. C. 1
5 immobilized field hospitals	at 8 =	40	
1 C. O. hospitalization		1	
Total commissioned M. C.		41	
1 adjutant (San. C.)		1	Total commissioned San. C. 1

Grand total M. C.	121
Grand total San. C.	4
Aggregate, commissioned	125

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It will be noted that the sanitary personnel for a division given above is about as large as prescribed in the Tables of Organization since 1917, nevertheless it is believed that the above arrangement is better balanced for reasons to be discussed later.

It will also be noted that the above arrangement provides no C. O. for the units known as the Sanitary Train but places the division surgeon in direct command. This, in our opinion, is as it should be.

Nor is this an impossible task.

The analogy for this can be found in the fact that the artillery brigade commander functions also as the divisional artillery officer and the C. O. of the regiment of engineers as the divisional engineer.

There is ample reason for the division surgeon to be with his ambulance companies, dressing stations and field hospitals during action.

To place the sanitary train under a commander not a medical man is an absurdity, nevertheless to all intents and purposes the C. O. of the divisional train commands also the ambulance companies and field hospitals, and the C. O. of the sanitary train, as now provided, assumes full and independent command, subject to direction by the division surgeon, only after the commander of the trains releases the sanitary units. All this leads to division of authority, confusion, waste of valuable time and energy.

It will be held that the division surgeon has ample work in his office as such. This is true, under our present system of paper work and administration with unequal division of work.

The statistical reports from the diverse divisional units, for example, could be turned over to the epidemiologist for correction, tabulation, and charting. "Sick and Wounded Reports" should be abolished for all field formations, except the immobilized field hospitals.

With the medical supply problems handled by an experienced officer the routine work preparatory to war should leave the division surgeon free to devote himself to the tactical training of his units; and certainly, during battle, his place is there where he can be most useful.

If this be so, there is no need for an additional C. O. of the sanitary train, which in our service is an innovation, as before the World War (Mexican border service) we had directors of the ambulance companies and directors of the field hospitals, and while these two units were not united, except under the division surgeon, there was no hitch.

The duties of regimental personnel remain as given in the manual.

The ambulance companies have a two-fold function—the establishment of dressing stations and the transport of the wounded from the front to the field hospitals.

The selection of the dressing stations is a simple matter. They must

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be accessible to a road, as near the firing line as consistent with safety (?), preferably in a village affording shelter, water, etc. Their present organization appears satisfactory, but their equipment should be improved to permit emergency operations of a vital character.

The field hospitals must be either what their name implies—and according to present organization and equipment they are not—or else, if evacuation hospitals be available, their *raison d'être* as such does not exist, unless it is intended to provide in the field additional dressing stations, affording shelter for a few days.

But for such purposes the present field hospitals are too well equipped, but not well enough to function as advanced evacuation hospitals.

The experiences of the World War tend to show that the medical service of the front would prove more effective if hospitalization could be given the wounded as early as possible after receipt of injury. If the field hospitals can hospitalize patients—and they can—there is no need for evacuation hospitals.

It is believed that a division should have six field hospitals, but only one of which should be mobile to accompany the division in advances. Such a field hospital should be motorized and have a bed capacity of 300.

The five immobilized field hospitals should have a total bed capacity of 2,500. The equipment should be arranged in "units," that is to say, the outfit should be able to divide the entire equipment in three sections, each of which should suffice to augment another hospital or, if need be, work independently.

For the mobile hospital the following personel will be needed:

1 major, C. O., and senior surgeon.

1 Lieutenant, Adjutant, supply, mess, etc., (Sanitary Corps).

5 captains, or lieutenants, Medical Corps; 4 operating surgeons, 1 anesthetist (bacteriologist).

1 sergeant, first class—first sergeant, admission records.

1 sergeant, first class—supplies.

1 sergeant, first class—commissary (mess).

10 sergeants (tentage, kitchens, records, motor repair and transportation, night ward master, operating room, dressings, special ward (internal diseases), supernumerary.

90 corporals, privates first class, and privates.

Tentage: 11 large tents (Gilchrist) or equivalent. (One as operating room with two operating tables, 10 to contain 30 beds each).

3 tropical tents (as office, admission ward (triage) and storeroom).

7 wall tents for officers, 3 conical tents for N. C. O.'s and 15 conical tents for the rest of the personnel. Transportation: 11 trucks and 2 side-cars.

As for the five immobilized field hospitals, they should have the equipment of evacuation hospitals, dressing boxes, bedding units, beds, tentage, kitchens, etc., being divisible by three.

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The transportation is a matter of calculation.

To these units should be attached the consulting staff from headquarters. One of these hospitals will carry a field X-ray equipment; another a complete bacteriologic laboratory, both of which serve all units.

Each such immobilized filed hospital, in addition to the officers, should have: 4 sergeants, first-class, 15 sergeants and 150 corporals, privates first-class, and privates.

VI. AN IMAGINARY WAR

Let us assume the following piece of fiction to be reality. The author has borne in mind several phases of war which ought to demonstrate whether an organization as proposed in the preceding section is practicable. It may be added that the terrain is not altogether imaginary. It is realized that no "map maneuver" can replace actual experience, but, as a matter of fact, problems likely to be presented by actual war are solved on the map as well, if not better, than actual terrain under the stress of battle.

The narrative in the first person of an imaginary medical officer is believed to be a palatable vehicle at least for such readers who experience difficulty in visualizing technical descriptions.

WAR DIARY OF DR. YOUNG

February 16, 1922.—At last the exchange of notes has come to an end. The South American republic of Paragonia, blinded by indescribable hate for the "big brother" north, has thrown down the gauntlet. Uncle Sam has no alternative but to fight. It is no easy task at that, I am told by Captain Enright of the Engineer Corps, who has been there and knows the people and their army. The country is almost tropical, hilly, with but few good roads and railroads. Enright says that the Paragonians will fight to the last ditch and that no victory will be complete until we have entered the city of Paragonia, their capital, in a position to dictate terms (Paragonia city is fortified in a modern sense). I telegraphed the Surgeon General of the Army requesting assignment to active duty under my commission as a first lieutenant of the M. R. C. Inasmuch as I have served in a field hospital in the A. E. F. I hope for assignment with a like organization with increased rank.

February 17.—No reply from the S. G. as yet. My Encyclopedia Britannica has a small but fairly practical map of Paragonia. All I can learn is that, like all South American countries, it is accessible via the Atlantic and Pacific oceans, that the capital lies almost in the very center of the Republic—200 miles from either coast.

February 19.—Hurrah! A telegram from Washington orders me to report to the C. G. of the 62d Division at Camp Columbia, near Tampa, Fla., not later than the 25th, just time enough left to get some new camp equipment, wind up affairs and make the journey.

February 26.—This is a new division they are assembling in Florida. More than one hundred doctors are already in camp. We reported to the division surgeon yesterday. We are sent to the camp hospital for the present, pending definite organiza-

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tion of the new regiments and the sanitary train. Some of us had been in the World War. The division surgeon, to my great surprise, seems to care far more for surgical experience than military training. Not much chance for me—a general practitioner! We have to furnish all information about graduation, hospital training, practice, military service, etc., on blanks furnished us.

February 29.—The service in the camp hospital amounts to a professional test. This became apparent when two new officers who claimed to be surgeons were sent away. They were given an opportunity to do a minor operation under the supervision of the chief of the surgical service, and they failed.

March 2.—First conference in division surgeon's office. Colonel Worth, M. C., outlines the duties of the regimental surgeons, the ambulance personnel and the mobile and immobile hospitals in the field. I beheld the gist of the whole talk in one sentence: "The personnel nearest the firing line should evacuate to the rear as little as possible; the personnel on the rear should aim to evacuate to the front as much as possible." Another sentence struck me as forcible: "It is impossible to discuss the transport of wounded from the standpoint of the organ involved. Each class of injuries may present phenomona of a variable character, calling for immobility or immediate transport, depending on the very character of the injury. To illustrate, take a gunshot wound of the abdomen. Some of this class of injuries will be safest if left severely alone for a few days; others may be saved only by laparotomy performed within an hour or so after receipt of the injury."

March 3.—We received our permanent assignment today. I am to command an ambulance company, because I know something of map reading and drill. For a field hospital, I am not surgeon enough. Colonel Worth wants trained surgeons only—even the C. O's.—in the field hospitals. His ideas begin to dawn on us. The field hospitals must cure nearly all cases. Only those patients who will be useless for further military service, or whose injuries will incapacitate them for months, should be evacuated.

"The old idea of keeping field hospitals as empty as possible so as to allow bed space after each action is all right, but combat tactics have changed and with our facilities we should never be full, even after half of the division has been reorganized by replacements." Personally, I doubt that very much; the books I have read do not agree with our enthusiastic and able division surgeon. We shall see!

April 10.—Our training is over. Oh for the many lectures and terrain maneuvers Each of us has made a map of a limited area, has drilled his outfit, has pitched a dressing station or field hospital. The regimentals "have pitched" aid stations under the bare sky. We have learned our regulations, manner of making reports, of caring for the dead; we have even had some lessons in Spanish. It was a wonderful course. If Colonel Worth's teachings turn out in the field as successful as they appear from the blackboard, we shall function like clockwork.

We were inspected today. We had to show two watches, an electric flashlight, notebook, pencils, compass, and a small haversack for tobacco, pipes, books, and one change of underwear. I confess not a detail has been overlooked. Even our "passports" are in our possession. We are to embark for Paragonia on the 15th.

April 26.—We arrived yesterday without a mishap at Zagora, a city of about the size and appearance like Cleveland, Ohio, but one of Paragonia's foremost seaport towns on the Atlantic. Everywhere American flags over larger buildings. M. P.s and infantry patrols can be seen on every important thoroughfare. Zagora has two base hospitals each of about 3,000 beds; more are to be established soon. I visited both and found them well equipped. Zagora is our base of supplies. I

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secured anything I wanted from cigars to pocket lamp batteries. The heat is terrific. We are allowed to live in campaign shirts. As for the situation we can learn but little. Zaroga has been taken by the Americans without a shot, the navy having disappeared and the army withdrawn to the interior to protect the capital. A few divisions of our regulars are already in contact with the enemy, but there is no intention to undertake an earnest offensive until our entire overseas force has arrived. Our division will not be fully assembled for a few days yet.

April 30.—We are slowly moving in a westerly direction in a company troop train. The first car contains some artillery and machine guns, posted for immediate action. "Lookouts" are placed everywhere. This train carries the ambulance companies and the mobile field hospital only. I understand a regiment of engineers and the headquarters company have gone ahead yesterday. Headquarters and some infantry are to follow tonight. The trip to the "front" lasts seventy-two hours. Sleeping facilities—none.

May 16.—At last war! We are to go into action tomorrow. I am relieved from the command of the ambulance company. Lieutenant Colonel McCleanzy, sanitary inspector, is sick. I am to take his place and function as Colonel Worth's adjutant too. While I regret the loss of my command, I shall probably have a greater field of usefulness. I am initiated in the war plan. The capital will be attacked from the north. For the past two days we have heard the boom of heavy cannon. The enemy is strongly entrenched in a circular line around Paragonia. The most forward positions are nearly 50 miles from the city proper.

Division headquarters is at Sacramento, a small village. I rode from here with Colonel Worth to all regimental aid stations and the dressing station early in the morning. This afternoon we inspected the field hospitals. I append a rough sketch of the situation, which I drew from notes and the blue-print maps furnished us from the general headquarters.

The difficulties we have to contend with consist principally in the inadequacy of transportation. Between Zagora and the city of Paragonia is but one double-track railroad, running in a straight line, eastwest. Two divisions straddle the railroad, but our division, as can be seen from the map, is not only 70 miles from the railroad, but that is hard to reach, as the mountainous roads are too narrow and in too bad a shape for extensive transportation. Indeed our march into position, which began as soon as we detrained at Hialo on May 3, lasted nearly five days, due to our desire to retain contact with our transport columns, which are motorized. Rations, ammunition and other supplies are being delivered without a hitch, however.

This situation explains the reason for the slow but adequate preparations for attack. Each frontal sector has so many reserves in depth that any counter-attack would be checked with ease. We are also certain that we cannot be outflanked, though we do not know to what extent the enemy may be reenforced from the south and southwest. We learned that a million men have been mobilized and that the enemy maintains several training camps for reserve, which are said to be beyond our reach. However, they have not reckoned with our aviation corps, which will soon have a strong representation here.

Accordingly Colonel Worth recommended to the Chief of Staff the following disposition of the sanitary units:

1. Regimental personnel to accompany the regiments and to establish aid stations at places within the regimental areas protected against enemy fire.
2. The main dressing and assortment station to be in Onaga Distillery (see Fig. 2).
3. The mobile field hospital to be at the outskirts of Sacramento.

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4. The immobilized field hospitals to remain at Tana, north of Sacramento, one to be pitched, the others to remain unpacked to await orders.

The Chief of Staff did not at once approve but demanded the strategic reasons for this disposition.

Colonel Worth replied that as no one can tell the kind of a defense the enemy will put up, he has the mobile field hospital in the most advanced situation, affording relative safety and reducing the transportation distance to the minimum for those needing immediate surgical assistance. For those requiring prolonged hospitalization Tana is ideal because it has water and village facilities, in addition to being easily reached by motor. Should an advance take place very soon, sooner than would be the case with a disciplined antagonist, he would transform the mobile hospital at Sacramento into an immobilized hospital, bring up a section from Tana and increase the facilities at either place as conditions permitted.

This idea proved practicable, was accepted, and added to the general battle order.

Colonel Worth sent the following field messages:

1. C. O. Ambulance Battalion, 62d Div. V. 16, 22, 5. p. m.

Proceed at once in accordance with previous oral instructions on the road Sacramento-Alma north, taking the entire battalion less one ambulance and chauffeur, establish a dressing station at the Onaga Distillery and arrange also a slightly wounded camp in immediate vicinity.

All cases requiring surgical intervention should be sent to mobile hospital along the road immediately south of Sacramento. All cases requiring hospitalization should report at that hospital for inspection by Officer of the Day and on his instructions proceed to Tana, about 10 miles south of Sacramento, to the C. O. of hospitalization.

Instruct chauffeurs to keep to righ of road and not to interfere with trucks of train.

I will be at Sacramento until 3 a. m. Will join you at about 4 a. m.

WORTH.

2. C. O. Mobile Hospital, No. 62. V. 16, 22, 5 p. m.

Pitch your hospital at place agreed on this noon. Prepare your operating team to begin work not later than 8 a. m. tomorrow. Appoint one officer as O. D. to not only receive all patients sent directly to you but to examine all patients sent from the dressing station to hospitalization center at Tana to determine whether transport is safe. Retain those in need of surgical attention (especially secondary hemorrhage cases) in spite of their original destination. If in need of more bed capacity or help send messenger to dressing station at Onga distillery, on right of road Sacramento-Alma. WORTH.

3. C. O. Hospitalization, 62d Div. V. 16, 22, 5 p. m.

Open at once one complete field hospital your section at place designated yesterday. That hospital should take over X-ray service and bacteriologic laboratory. Prepare to receive patients tomorrow not later than 9 a. m. Prepare for light diets for 100 and semi-solid diets for 150. Telephone will be installed soon; meanwhile send all urgent messages to Message Center, Div. Hq. Keep each other section in shape to pitch or move forward as orders will reach you. Report by messenger when above order has been complied. WORTH.

After supper I sat up for a long time, and while smoking I reflected somewhat on the situation. Deep in my heart, with all the confidence in the chief surgeon's ability, I still had that dread of something going wrong. I was tempted to take a pencil and estimate the possible casualties on a per cent basis, but I recollected an instruction given Major Carr of the 49th Infantry, which was to remain in reserve, to be prepared to go with his men to the assistance of any of the three engaged regiments, as one may be nearly wiped out while the other may hardly sustain any casualties.

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Therefore I, too, must have confidence in a thorough coöperation of the units and just await what is to come. As tomorrow promised to be a hard day I went to bed.

May 17.—Colonel Worth and I left headquarters at 8 a. m., proceeding to the battle line. We had the main road clear, though we were halted several times by military police. When we entered the hastily thrown up entrenchments we saw the infantry resting on the ground fully dressed, only sentinels and listening posts being on duty.

We visited the three regimental aid stations. Each had markers beginning from the concerned road and trails. A few shelter tents being strung over poles like the roof of a small shed were to afford shelter to all who were not to be moved to the rear. The equipment was strictly that of the combat equipment, but each station had a litter rigged up on tree-stumps, so that the surgeons could dress patients with greater convenience. The station was so close to the hills that artillery could not reach it with ease.

We walked back to the distillery and found the park of the ambulance section. Colonel Worth expressed great satisfaction at the preparations. A field kitchen was preparing coffee and soup for the patients, if any.

A few minutes after we reached the dressing station our artillery began a drum fire, with an occasional shot from our howitzers, of which we had but a small number. The fire was no more intense than I have heard for several mornings past.

To my surprise it ceased after an hour, just as it had on previous days. Soon after, I could discern the cracking of infantry rifles and machine guns. It was evident to me that we had launched the infantry attack without an adequate artillery barrage. This may have been due to two reasons; first, to lull the enemy into the belief that the artillery preparation had today no other significance than that of preceding mornings; secondly, in the mountainous terrain the artillery could not produce any effect.

Be this as it may, the first ambulance began to come in early in the forenoon. For a while it looked as if the stream would continue throughout the day, but at 8 p. m. we received word that no more wounded were present.

The fire had ceased at 2 p. m., and I learned later in the afternoon that the attack had been stopped.

When I expressed my astonishment to Colonel Worth he replied that all this may be due to a well thought out plan and that all sensible medical officers should take advantage of every lull in fighting and get some sleep.

We went to the regimental aid stations, later returned to the dressing station and thence visited the mobile field hospital. The following figures were obtained.

Killed on the battlefield	61
Died at aid stations	4
Total deaths	65

67th Infantry.—Total wounded 49. Of these 7 were returned to the firing line and 42 sent to the rear.

42d Infantry.—Total wounded, 83. Of these 9 were returned to the firing line, 1 kept at station for pronounced shock, 73 sent to rear.

10th Infantry.—90 wounded; all sent to rear.

Artillery and 49th Infantry, no casualties.

Total sent to dressing station, 205.

Assortment:

G. S. W. of head, severe, 4—Ev. to F. H.

G. S. W. of head, slight, 1—Retained.

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G. S. W. of chest, severe 6—Ev. to F. H.
G. S. W. of chest, slight 2—Ev. to F. H.
G. S. W. of neck, severe 1 (tracheotomy at dressing station)—Retained.
G. S. W. of abdomen, 3—Ev. to F. H.
G. S. W. of shoulder, 8—Retained.
G. S. W. of forearm, 4—Retained.
G. S. W. of hand, 1—Retained.
G. S. W. of thigh, 80—Ev. to F. H.
G. S. W. of leg, 91—Ev. to F. H.
G. S. W. of spine, 1—Ev. to F. H.
G. S. W. of face, 2—Ev. to F. H.
G. S. W. of chest and thigh, 1—Ev. to F. H.

Of the retained cases it was hoped to return 75 per cent to the front within thirty-six hours. The rest would be evacuated the next morning. At the field hospital they decided to laparotomize only one patient, perforation having been established beyond doubt. All head cases were treated surgically. No debridements were done, as the injuries were almost exclusively caused by jacketed bullets, and the wounds were comparatively simple.

During the night another infantry attack was launched by us, the enemy offering stubborn resistance. Nevertheless we succeeded in gaining a foothold on a hill running south of Alma. Toward noon the next day we had Alma in possession.

For three days our division fought against tremendous odds without having gained more terrain, then a halt was ordered.

I felt depressed when I learned of what I believed to be a vain sacrifice of human lives. Imagine my surprise when I noted much jubilation at Sacramento. Then I learned that we had succeeded in drawing so many enemy forces to our sector, where they were led to believe was to be launched the main assault, that the two divisions straddling the railroad had made a dent of nearly 6 smiles without great loss and were already having the engineers at work repairing the railroad and even building branches.

This three-day battle cost us over 600 dead, 1,300 slightly wounded and about 2,000 seriously wounded (including 210 wounded prisoners).

The mobile hospital had taken care of all emergency work, and had evacuated nearly 50 per cent of its inmates to Tana, where only four immobile field hospitals are functioning.

To be exact, a check at our office shows:

At dressing stations: 1,300 slightly wounded.
At mobile field hospital: 182 severely wounded.
At Tana: 1,818 severely wounded.

May 28.—Doubtless for strategic reasons neither our own nor the two flanking divisions of our army crops had been fighting since the 20th. Nevertheless there were occasional night attacks by our outposts. as they were anxious to capture the enemy sentinels.

The aid station reported this a. m. to have evacuated to the regiments practically all slightly wounded cases. Only four developed suppurating wounds and were evacuated to Tana.

The mobile field hospital returned only eleven cases to the front, six died, and the rest were sent to Tana. The C. O. of hospitalization reports that he is ready to evacuate to Zagora 500 patients. Nineteen have died. Only forty-two have been returned to the front. The rest are convalescing.

Twelve hundred replacements arrived at Sacramento and were distributed among the regiments.

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August 16.—Since my last entry torrential rains have prevented extensive activities on our part. The enemy, too, has been quiet. We have had a slight endemic of intestinal trouble, but this was easily controlled.

Today activities have been resumed. The situation is about as it was, with this difference, that the 49th Infantry has occupied the position of the 67th Infantry.

Late in the afternoon the enemy posted machine guns on hill tops and had them so well camouflaged that our field artillery could not locate them, with the result

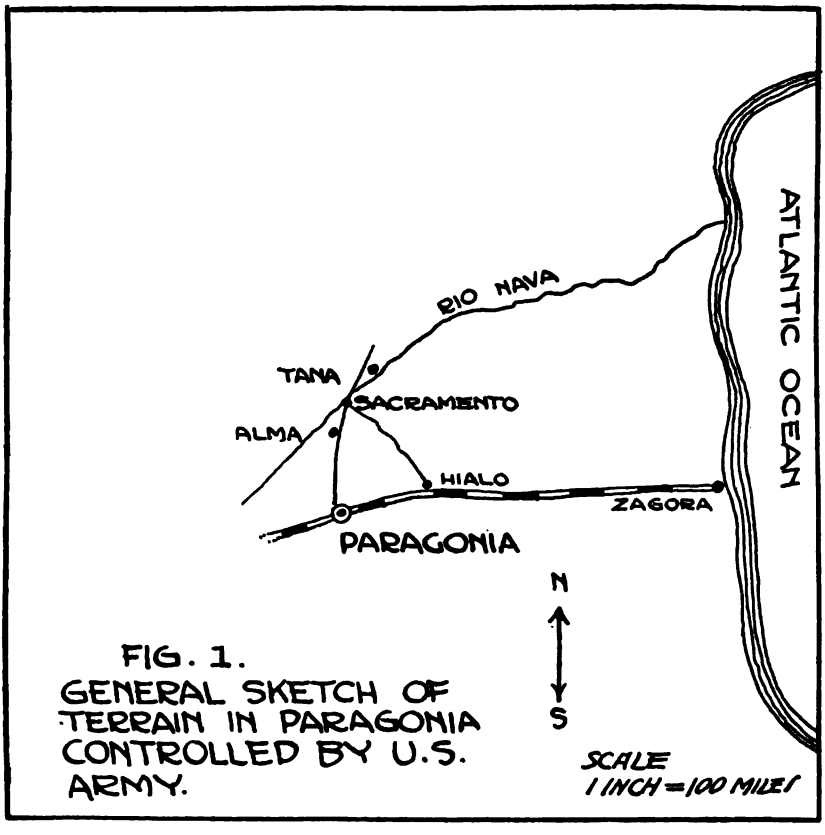

FIG. 1.
GENERAL SKETCH OF TERRAIN IN PARAGONIA CONTROLLED BY U.S. ARMY.

that our front lines were nearly wiped out. The infantry was ordered to retreat to the trenches north of Alma.

Though we left many dead on the battlefield, the retreat was completed in perfect order. Practically all wounded were littered back. Only a small number fell in the hands of the enemy. Colonel Worth at once ordered a section from Tana to the Onaga distillery. By 7 p. m. the section was functioning. F. H. 62 is filled. Tana has received 416 cases by midnight. Colonel Worth has gone to the front.

August 17.—Fighting was resumed at 4 a. m. By noon Alma was again in our possession. We took over 3,000 prisoners; 216 among them slightly and 47 seriously wounded.

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Our casualties amount to 612—about 150 severely wounded among them. Additional howitzers arrived today. It is promised that we shall push forward from now on. The entire hospitalization has been moved to Sacramento. The mobile field hospital goes to Alma early tomorrow. The dressing station is to be in a farmhouse 2 miles south of Alma.

September 9.—We are now in possesion of the innermost forts. Paragonia city is but 3 miles distant. Our patrols say that no troops are visible between our lines and the capital city.

For the last few weeks fighting has been ceaseless. In spite of this our hospitalization scheme has worked out well. Only for a few days the number of severely wounded exceeded our total tent capacity by about 700. This was overcome by utilising the houses of villages and by organising a visiting medical service.

As the war seems ended I can now sum up our total casualties since the beginning of the fighting.

Killed.....	8,200	Of these died.....	410
Slightly wounded...	11,270	Returned to duty...	12,850
Severely wounded..	9,000	Evacuated base.....	4,200
Total wounded...	20,270		17,460

Of the 2,810 still hospitalized, only four are expected to die; 2,000 will be taken to the capital within a week. The rest will require hospitalization for about three weeks, and as they are not likely to get completely well for months to come will then be evacuated to the base at Zagora.

September 21.—Our triumphal entry into the capital proved a rather tame affair. We knew we had captured the rear-guard units, but if we expected the President and his cabinet and staff to hail us as his conquerors we were disappointed. Only the burgomaster of the city appeared to turn over the "Reyes" to the commanding general; that is what we learned when our division reached the parade ground near the presidential palace.

The government and the intact part of the entire enemy forces had made a successful retreat to the south and southwest—exact whereabouts unknown.

A day later we heard that Washington ordered a continuation of the campaign until the army was beaten and the civil authorities captured.

To my great disappointment I learned that our division was, for the present at least, to garrison the capital. Colonel Worth was transferred as corps surgeon of the 3d Army Corps, which consisted of the 9th (Regular), 37th (National Guard) and 102 (Volunteer) divisions.

But my gloom was rapidly dispelled when I learned that I had been previously promoted and was to accompany the colonel to corps headquarters, which was beginning reorganization in the capital.

The third corps was to lead the march south. It was to be commanded by Lieutenant General Hardy whom, rumor had it, the War Department could deny nothing he asked for.

General Hardy, I soon learned, heartily disliked our system of brigading. "A brigade consisting of two regiments of infantry is no brigade at all, and if you insist on this, such a brigade should be commanded by a senior colonel—but not by a general."

"A brigade should be a fighting unit, consisting of three regiments of infantry, of artillery and the necessary detachments of technical troops." This, it is said, is what he demanded of the War Department and what he was granted.

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He was reorganising his three divisions on the new basis proposed by him and even intended to place a brigade surgeon on the staff of each brigade commander, for which purpose he asked Colonel Worth for a conference.

The corps surgeon pointed out that there is absolutely no place in his scheme for brigade surgeons, that each division surgeon has sufficient liasion between the regimental medical officers and field sanitary units, and that each medical officer must have work and hard work and responsibility, while a medical adviser to a brigade commander would be a mere decorative officer.

Colonel Worth's ideas were concurred in.

I do not know yet what my particular work will be like. Colonel Worth is not enthusiastic over his appointment as corps surgeon, feeling that he would have little to do beyond collecting casualty reports. Meanwhile he is supervising the supply of all units of the corps.

An ambulance company and a mobile field hospital are added to Corps Headquarters. Colonel Worth intends to use them wherever needed. I am to be attending surgeon to Corps Headquarters, adjutant and general factotum to Colonel Worth.

October 5.—Our aviators and intelligence service have located the enemy. The government has set up its headquarters at Tortillas, an inland city, 160 miles south of the capital. The entire Paragonian army, after having destroyed as much of the railroad as it could during its flight, has entrenched in three systems to protect the approaces to the temporary "capital."

Colonel Worth tells me that the corps is destined to bear the first brunt of the campaign. Several divisions are already engaged in the task of guarding the railroad engineer regiments which are repairing the destroyed railroads.

The base hospitals at Zagora now function as embarkation hospitals. Paragonia city will be our advanced base. The chief surgeon of the oversea forces has already established his headquarters there and was turning castles, public buildings and regimental barracks into base hospitals.

The terrain south of the capital, with the exception of a chain of high hills within 10 miles from the capital, is practically even.

As the corps will not leave the capital for about a week, Colonel Worth has summoned his three division surgeons and has instructed them to hold daily school for all medical officers, especially the regimental surgeons.

The latter have been ordered to drill their detachments and the regimental musicians in the proper manner of approaching the wounded under fire—a method resembling infantry rushes. As I have many clerical labors to complete I cannot go to see these drills, much to my regret.

October 16.—Corps Headquarters is leaving today for the new front.

October 18.—We arrive at Tortugas, a miserable village. An old stable is the only available place for Colonel Worth's office. I am to accompany him tomorrow to inspect the 102d Division. I learn that the strategic plan is simplicity itself. The distance from corps headquarters to Tortillas is approximately 80 miles. A good road runs parallel to the railroad connecting the two points. There is no river with potable water in the terrain to be occupied. A water train will ply between Paragonia city and the occupied terrain. For the rest, dependence must be had on the wells used by the civilian population, after analysis by special details, which accompany every division.

The front will extend about three miles to the right and three miles to the left of the railroad, as the marshy terrain further on prevents flanking movements by

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either side. While enveloping movements on a small scale will be attempted by individual regiments, the principal fighting will be frontal in character. The enemy is strongly entrenched at Moras, Pueblo and Matesa, having developed trench systems extending from five to eight miles in depth. These trench systems will have to be taken.

November 1.—Our corps has taken position a mile north of the foremost enemy trenches at Moras.

Artillery fire began at 6 a. m. and lasted until 10 a. m. Five minutes later our infantry swept over the first-line trenches and attacked the second-line trenches with hand grenades. The enemy in large force attempted a sortie, and a bayonet mêlée ensued. We took the second-line trenches and stopped further advance owing to heavy bombardment by enemy artillery.

The center division (102d) suffered most. The regimental litter bearers, however, had approached the wounded, had rendered first aid and collected them in trenches. The regimental aid stations were moved there by 5 p. m. At 7 p. m. 240 wounded (severely) were littered back to the rear of the ambulance park, whence they were conveyed to the 102d mobile F. H. The divisional immobilized field hospitals at Saltillo remained idle. The 9th and 37th divisions at 10 p. m. reported a total of 309 severely wounded. The 9th had pitched a mobile F.H. in the woods and succeeded in getting all its severely wounded to it before midnight.

Colonel Worth directed me to report to the division surgeon of the 9th Division as "liaison officer."

November 2.—I spent the entire day with the 9th Division. Practically the entire trench system was gained in three hours fighting after a preliminary bombardment. The enemy withdrew in great haste and left many dead and wounded in the trenches.

The division lost 310 killed, 810 wounded. I accompanied the center regiment and saw that the regimental surgeons kept all slightly wounded and the gravely shocked cases in the trenches. All transportation began at nightfall. A few men venturing out in daylight drew heavy shrapnel fire. The mobile field hospital was acting as an assortment station, the dressing station being busy with the slightly wounded cases, of whom there were several hundred. The division surgeon directed 30 ambulances to proceed to the mobile F. H. One hundred and twenty severely wounded were loaded and taken to Saltillo, which by now had 15 immobilized field hospitals. They came back in three hours and took away the remaining cases to be transported. I went with the last ambulance to Saltillo and found there Colonel Worth, to whom I reported.

General Hardy had moved into Saltillo. There was to be no fighting tomorrow. I worked in one of the immobilized field hospitals until 6 a. m., principally giving anesthetics. At 7 a. m. I went to sleep.

November 6.—There has been a good deal of fighting in the open. The nights are bitter cold. Today we had the first snow. The Paragonians are fighting from ambush a good deal, but even that did not stop our advance. We have occupied Zapatas, a mere compound of ramshackle huts. The regimental bearers are searching the ground for wounded until late in the night, using lanterns which are so constructed as to hide the light from the enemy.

I am to go in the morning with a train on which 400 wounded are to be evacuated to Paragonia City. The same train is to bring back a number of canvas strips with handles. Colonel Worth wants no litters on the battlefield, as some of our litter bearers in the 37th Division have been wounded. I a lso to bring a number of

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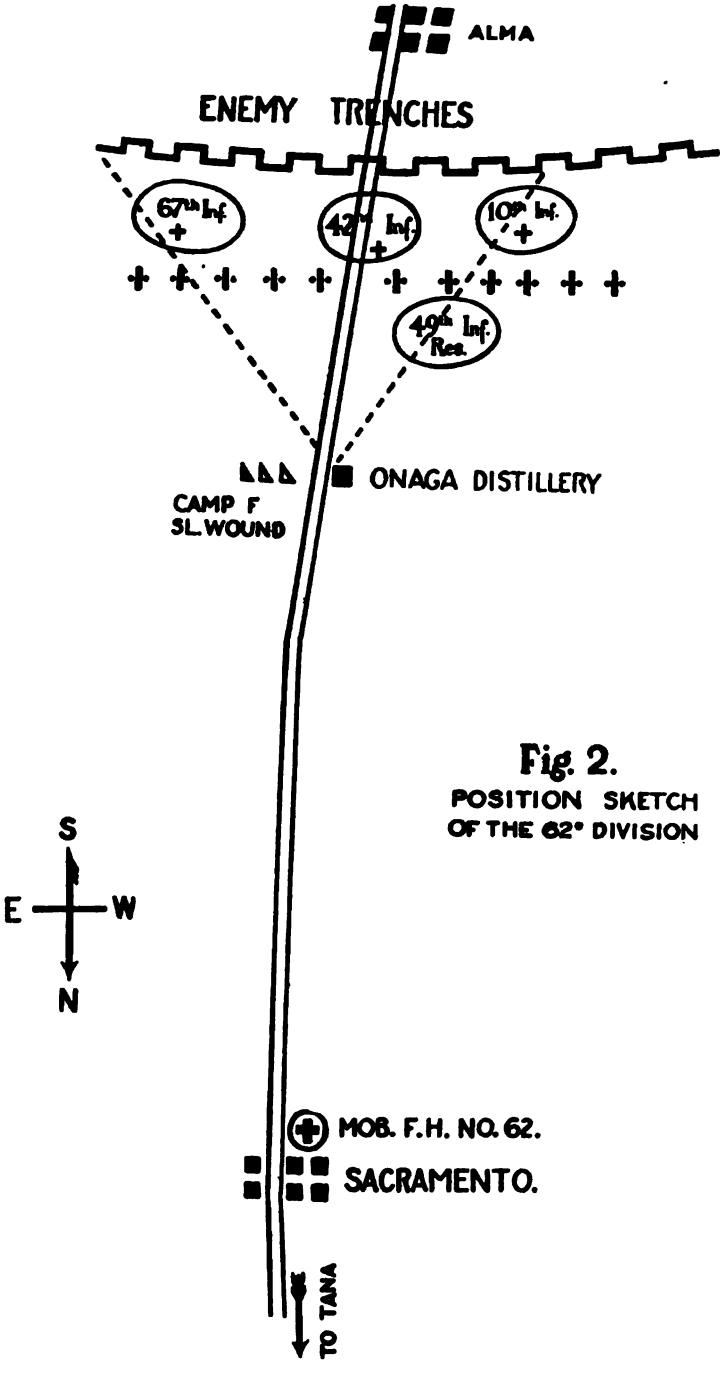

Fig. 2.
POSITION SKETCH
OF THE 62° DIVISION

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tent heaters. I understand today that, if the Pueblo trench system will stand our attacks no better than Moras, the corps hospitalization will be concentrated at Mujer, which is supposed to have certain facilities, there being a large cheese factory and a distillery, which will be utilized.

November 22.—The entire Pueblo system has been stormed. I did not see very much today as the C. O. of the 9th Div. Ambulance battalion has been wounded and I was ordered to take his place. From 1 until 4 p. m. I have been assorting the wounded, about 300. I pitched eight small tents and collected 92 slightly wounded but these could accommodate only 56 patients. A haystack in the vicinity was requisitioned and the least injured made comfortable. An ambulance brought me 100 blankets. The men were inspected several times during the night and seemed comfortable. At 5 a. m. we served hot coffee and a light breakfast. By 7 we had redressed all who slept in the hay, and as the sun was now out in full glory the men themselves begged to be returned to the front. Two had wrist wounds of the right hand. I evacuated them to the hospitalization center.

December 18.—We are marching in Tortillas streets. The enemy has surrendered unconditionally. Our corps has now its headquarters in the temporary capital. Washington is sending peace plenipotentiaries. I am again with Colonel Worth, who has just been promoted temporary brigadier general. A pair of new gold leaves fill my heart with joy.

I have seen too little of the last and final fighting to give a detailed account of the fall of the Matesa trench sector. But I am at work in General Worth's office collecting and tabulating the field reports. By them I can plainly see that if we ignore small variations the battles have shown approximately the same result.

Taking each division of the corps as a unit, we find that the figures do not fluctuate to any great extent.

General Hardy's divisions, of course, differed from the 62nd Division in their numerical makeup.

The 9th, 37th and 102d divisions each had:

2 brigades of 3 infantry regiments	18,000
Artillery and small detachments	1,200
Total	19,200

Of these he never had in action more than four regiments plus artillery, keeping two regiments in reserve.

The casualties throughout the entire campaign in the south for each division averaged per principal battle day: Slightly wounded, 8,230; severely wounded, 1,114.

Battles seldom exceeded three days of hard or mass fighting. At the conclusion of the last battle (Matesa) which lasted five days, there was an average of 5,200 for each of the three divisions needing prolonged hospitalization. The mobile field hospitals sent daily approximately 200 patients to the immobilized field hospitals and still could take care of 100 patients who could not be transported. The immoblized field hospitals proved ample for every battle, as within three days, room was always provided through deaths, evacuation to the front and evacuation to the base.

I am now forced to acknowledge that General Worth's ideas were right. He has shown that:

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1. The system of the care of battle casualties should be as simple as possible, viz., regimental aid stations, one for each regiment, a principal dressing station, ambulance park and camp for slightly wounded combined, which is to check the

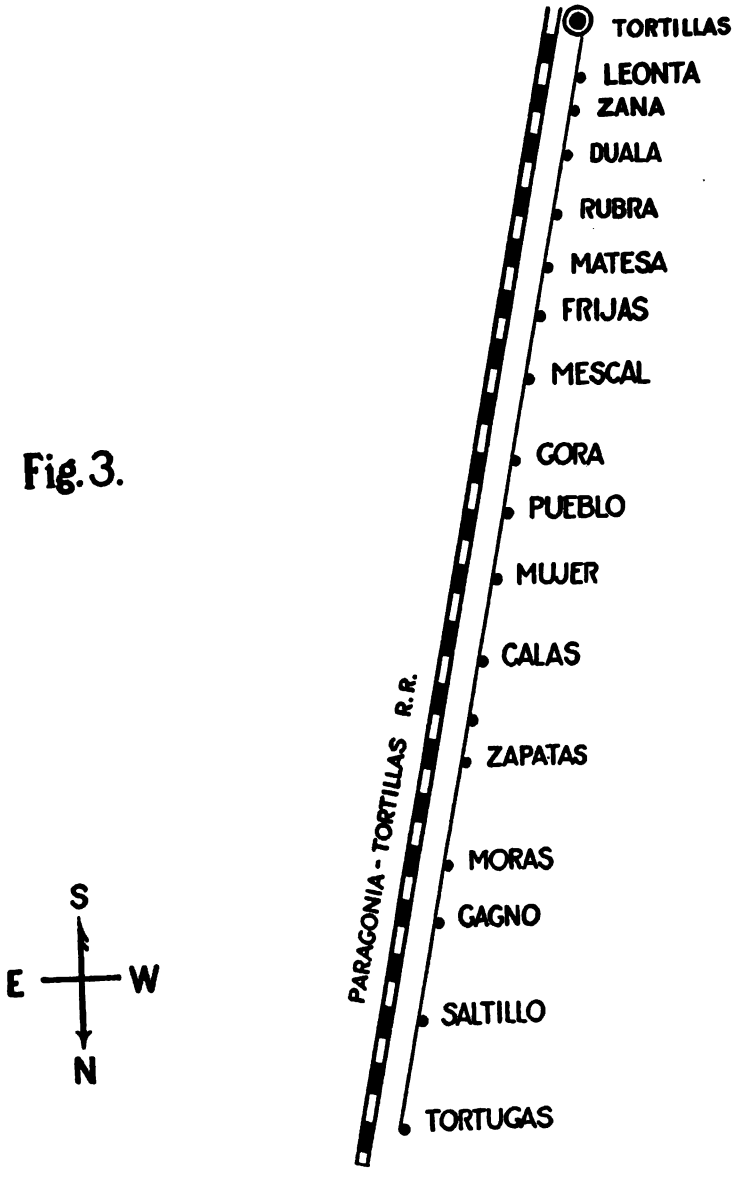

Fig. 3.

flow of slightly wounded and regulate evacuation to the rear, opportunity for surgery close to the front to reduce the time and danger incident to prolonged transportation (mobile field hospital) and temporary hospitalization at not too great a

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distance for all cases not requiring emergency operations (immobilized field hospitals).

2. The need of evacuation hospitals where railroad facilities are available has been shown not to exist.

3. Reduction of medical officers. In the absence of evacuation hospitals, even though the field hospitals need more medical officers now, there is still a fairly large number available which heretofore has been held up to comply with the Tables of Organization.

4. Elasticity. Each immobilized field hospital is really three mobile hospitals, easily separated and moved about and as easily held together as one hospitalization unit.

5. Centralization. The division surgeon, in combat, takes station with the principal dressing station and regulating point. That is his proper headquarters From there he can control the ambulance companies and hospitals. He is, thereby, the commander of all medical units. There really is not and should not be a "sanitary train," but a "divisional medical service" embracing: (1) Headquarters and staff; (2) regimental medical service; (3) ambulance battalion; (4) mobile field (surgical) hospital; (5) immobilized field hospitals.

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THE TRANSMISSION OF THE PNEUMONIA PRODUCING GROUP OF ORGANISMS

By Lieut. Colonel JAMES G. CUMMING, *Medical Corps, U. S. A.*, and Captain CHARLES B. SPRUIT, *Medical Corps, U. S. A.*

THE pneumonia group of organisms as here considered include only those varieties which have been isolated from the blood stream of pneumonia patients. These varieties are the type pneumococci, the hemolytic streptococcus, and streptococcus viridans. In civil practice the type pneumococci are common causes of pneumonia. This is not so in the Army. But where lobar pneumonia does occur among troops it is most frequently complicated by a secondary invader, which prolongs the period of illness and is the immediate cause of death. Not only are the lobar pneumonias complicated by secondary invaders, but so also, and with great frequency, do the virus infections—measles, scarlet fever and influenza—prepare the soil for an invasion of lung tissue by secondary invaders which are harbored in the upper respiratory passages.

Since the pneumonia group of organisms ranks first as a cause of death among troops not only as a primary infection, but to a far greater degree as a complication of the virus infections, it became necessary to make epidemiological and laboratory studies in order that preventive measures might be instituted.

A clinical study of these complicating pneumonias made it apparent that organisms other than pneumococci were responsible for the infection, and the question arose as to why these highly fatal secondary pneumonias should be the predominant type in the army camps. To determine this point it was imperative that the causative organisms be first identified. Having in mind the occasional occurrence of hemolytic streptococcus complications in cases of scarlet fever in civil hospitals, and recognizing that measles, the disease with which we were mostly concerned, also belonged to the group of virus infections, it was decided to make a search for this organism. An investigation of throat swabs of measles patients upon entrance to the hospital, and of sputum, empyema pus, and particularly the blood of pneumonia cases, left no doubt but that the offender in cases of scarlet fever in civil hospitals was now chiefly responsible for the heavy toll in post-measles pneumonia deaths in the Army. [1]

Why should this organism prevail in the tonsil to the extent of 36 per cent among all measles patients upon entrance to the hospital—

[1] Cumming, Spruit and Aten, "Streptococcus Pneumonia." *Journal American Med. Asso.* March 8, 1918.

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33 per cent of whom developed pneumonia—while in the civil population the carrier state and the post-measles pneumonia rate are comparatively low? There was evidently some sanitary defect responsible for the wide dissemination of the virus infections and the complicating hemolytic streptococcus in the army camps.

As early as the fall of 1917 our observations at Camp Tanforan, California, led us to suspect that the old line method of washing messkits in warm water was a faulty mess hall detail, leading to a wide distribution of mouth organisms.

During the winter of 1917–1918 in San Antonio we made further observations on the temperature and bacterial count of messkit wash water. It was not, however, until the influenza epidemic of September, 1918, that our epidemiological investigations at Newport News gave a practical demonstration of the importance of using only boiling water for washing messkits.

Among 66,000 troops it was shown that the use of tableware or messkits, which were washed in boiling water, had a marked influence in reducing the incidence of influenza and pneumonia, whereas the washing of messkits in warm water only resulted in five times more influenza cases and pneumonia deaths.[2]

In comparing the influenza-pneumonia death rate of the Army as a whole with this rate in the civil population, it is found that there were almost three times more deaths in the Army. This increased mortality in the Army was attributed to overcrowding, fatigue, age susceptibility, etc., but we maintain that our studies show these factors to be but of minor importance in the production of disease. In the large groups of soldiers which we studied there was no difference in age, fatigue, crowding, clothing, etc., and yet the influenza morbidity and pneumonia mortality were five times greater in the one group—that group which used lukewarm water for washing messkits.

It may be granted that there are many subsidiary factors in the production of diseases, but let us not overlook the one fundamental law for all acute infections, *i. e.*, that the introduction of the causative organism is essential to disease production and that the avenue of transmission of the various diseases should be very definite for each group, sputum, intestinal, and insect-borne.

Our study of pneumonia carriers was undertaken for the purpose of determining, first, the major and minor avenues of distribution of the "so-called" respiratory infections; second, to devise means whereby these avenues, according to their importance, might be blocked.

[2] Lynch and Cumming, "The Distribution of Influenza by Indirect Contact—Hands and Eating Utensils." *Am. Jour. Public Health*, January, 1919.

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It may be said that the pneumonias, the virus infections, influenza, measles, etc., as well as diphtheria and meningitis, have heretofore been classed as respiratory diseases. Our studies, however, show the fallacy of this terminology and indicate that they should be more properly called *sputum-borne* infections.

BACTERIOLOGIC STUDIES OF THE AVENUES OF DISTRIBUTION

The following laboratory studies include the isolation and identification of organisms of sputum-borne infections from eating utensil wash water, from hands, inanimate objects, and from air and floor dust. Both carriers and cases were used as sources of infection in this series of studies, and dust was secured from wards occupied by streptococcus cases.

Eating Utensil Wash Water.—In order to determine the prevalence of the organisms of the sputum-borne infections on eating utensils, the following procedure was carried out. All dishes and silverware were steam sterilized before they were used by those patients under investigation. After the mess each set of utensils was placed in a separate sterile container and brought to the laboratory. Here each set was washed in sterile warm water. The wash water was then examined in accordance with standard laboratory methods for the organisms in question. No attempt was made to type the pneumococci in this set of experiments.

It will be noted in Table I that streptococcus hemolyticus was isolated from 84 per cent of the wash water specimens, pneumococci from 63 per cent, streptococcus viridans from 65 per cent, and *B. diphtheria* from 2 per cent of the specimens.

TABLE I.—*Percentages of Positive Findings in the Examination of Eating Utensil Wash Water.*

	Total	Positive	Negative	Per cent positive
Streptococcus hemolyticus	32	27	5	84
Pneumococcus	16	10	6	63
Streptococcus viridans	32	21	11	65.6
B. diphtheria	156	3	153	1.9

Attention is here called to the fact that in public eating places where hand washing of dishes is practiced, the dishes may be more highly contaminated after than before they are washed. In some restaurants about 60 per cent of the organisms are removed, whereas, when machine washing with boiling water is carried out, 99 per cent of the organisms are removed.

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In a recent report it was shown that the use of machine-washed dishes is an important factor in the control of influenza-pneumonia.[1] The conclusion of this epidemiological report is here amply supported by the laboratory findings.

It will be recognized that eating utensils come in direct contact with the oral cavity. They are contaminated, partially washed in warm water, and introduced into the mouths of others. This surely spells infection. There is no more common avenue of sputum-borne disease distribution than through eating utensils, and the corrective measure lies in the simple process of using boiling water as a pasteurizing agent.

Hands.—The hands have long been suspected as the transmitting agent of the intestinal-borne infections. This is especially so in the case of food handlers. If the hands become contaminated with intestinal organisms, how much greater is the possibility of hand contamination in the case of sputum-borne infections! A casual observer will recognize with what frequency the hand visits the mouth and nose. This habit results in unquestionable hand contamination.

In order to determine the prevalence of hand contamination, the hands of cases and carriers were examined for pathogenic organisms. In the case of those infected with the pneumonia group of organisms, the balls of the fingers were rolled on the surface of 10 per cent horse blood agar plates, and, after twenty-four hours' incubation, colonies were picked and identified. By the same technical procedure, *B. diphtheria* was first obtained on plates of Loeffler's blood serum, but later a media developed by Capt. J. W. Cox, M. C., and consisting of azolitmin, Andrade dextrine plates, was exclusively used with better results. In this series of experiments, as in the former, the balls of the fingers were rolled on the surface of the plates. These were incubated; suspicious colonies were then transferred to Loeffler's blood serum tubes for identification.

In Table II the number of examinations and the percentage of positive findings are given. Streptococcus hemolyticus was found in 38 per cent of the specimens, pneumococci in 17 per cent, streptococcus viridans in 100 per cent, and *B. diphtheria in 5* per cent. In this series of tests four Type I and three Type IV pneumococci were isolated. It is to be noted that those organisms, which grow on selective media with a distinctive type of colony, give the highest percentage of positive results. In the case of diphtheria, the difficulty of colony identification was doubtless responsible for the low percentage of positive results. When, however, the Cox differential plate was adopted, this

[1] Cumming, James G., "Influenza-Pneumonia in 370 Public Institutions as Influenced by Dish Washing." In press, *American Journal Public Health.*

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percentage was increased. It is interesting to note that plates from the hands of several cases gave almost pure cultures of Kleb-Loeffler bacilli.

TABLE II.—*Percentages of Positive Findings in the Examination of Hands.*

	Total	Positive	Negative	Per cent positive
Streptococcus hemolyticus	340	125	215	38
Pneumococcus	41	7	34	17
Streptococcus viridans	8	8	0	100
B. diphtheria	144	8	136	5.5
B. tuberculosis	55	1	0	1.8

The high percentage of positive findings is wholly within the bounds of theoretical assumption. This is especially so in the case of those organisms, which are easily identified. It will be noted that the percentage from contaminated hands is not as great as eating-utensil wash water. The hands of cases and carriers are not, except under special circumstances as in the case of dentistry, introduced in the mouths of other persons, as are eating utensils. But the hands do contaminate inanimate objects, and these may be sources of transmission to others.

In contrast to the transmission by the hand route, it will be recognized that the highly contaminated eating utensil, which is not pasteurized, introduces infection with facility to others.

Inanimate Object Conveyors.—We all, during a single day, handle or touch many inanimate objects, which have been handled or touched by one or even a thousand individuals. It was with this point in mind that we examined inanimate objects with the view of determining the percentage contaminated with pathogenic organisms.

Inanimate objects in close contact to, or handled by, cases and carriers were the objects of investigation. These objects consisted of bedside table tops, bed posts, handles of sputum cups, and door knobs. In the isolation of the hemolytic streptococcus, sterile gloves were wiped over the object and then streaked on blood agar plates. The same technical procedure was followed with *B. diphtheria*, but the streaks were made on the Cox differential plates. In the examination for the pneumococcus, the object was mopped with a sterile swab moistened in bouillon. After thoroughly rinsing the swab in bouillon, cultures were made in deep 10 per cent horse blood agar plates, and after incubation suspicious colonies were identified.

In Table III is given the number of examinations and the per-

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centage of positive specimens. The hemolytic streptococcus was isolated from 13 per cent of the specimens, the pneumococcus from 50 per cent, streptococcus viridans from 26 per cent and *B. diphtheria* from 3 per cent. Of those strains of pneumococci which were typed the following were demonstrated: Two Type I and one Type IV from bedside table tops; two Type IV from door knobs, one Type I from a cup handle.

TABLE III.—*Percentages of Positive Findings in the Examination of Inanimate Objects*

	Total	Positive	Negative	Per cent positive
Streptococcus hemolyticus	61	8	53	13
Pneumococcus	14	7	7	50
Streptococcus viridans	45	12	33	26.6
Diphtheria	184	5	179	2.7

It will be noted that the percentage of positive findings from inanimate objects is less than from the hands, and as already shown the contamination of the hands is less than eating utensils.

Floor and Air Dust.—In making a study of the possibility of transmission of pathogenic organisms through the air route of travel, we considered it important to make a sharp distinction between air and floor dust. Could floor dust be heavily ladened with bacteria, while the air we breathe—5 to 6 feet above the floor—be practically free?

In carrying out this series of tests, wards occupied by measles and pneumonia patients were examined for hemolytic streptococci. In the examination of floor dust, the procedure was to collect the sweepings from a considerable number of small floor areas. These sweepings were suspended in sterile salt solution in the proportion of 1 to 10, and plated in deep 10 per cent horse blood agar.

In a series of twelve examinations of dust from approximately one square foot of floor area, there was an average of 13 hemolytic streptococci per square inch. In eight additional examinations the colonies were too numerous to count. In another series of seven tests sweepings were collected from given areas of 324 square inches, and it was calculated that there was one hemolytic streptococcus per square inch of floor spaces. The above tests were made on measles wards, and it will be noted that streptococci were present in sufficient numbers to be easily demonstrated. On the pneumonia wards there were 39 examinations, 25 of which were positive for hemolytic streptococci.

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Air Dust.—If the air-borne route of distribution is important as an avenue of sputum-borne disease transmission, it should be possible to isolate pathogenic organisms from the air with marked regularity. As cubicling and masking were resorted to as a means of preventing respiratory diseases—especially measles and influenza—and their complicating pneumonias, it was decided to devote our attention to the isolation of the hemolytic streptococcus. This organism, especially in the army camps, was the most common cause of the secondary pneumonias, and in addition there are no technical difficulties in its identification.

These air dust examinations were carried out on wards occupied by hemolytic streptococcus carriers or cases. The air was drawn through sterile salt solution by either a hand pump or by a water suction pump. The volume of air washed by the hand pump was determined by the water displacement method. The volume washed by the suction pump was calculated by determining the time required to evacuate a large collapsible bag of known air volume. Having this as a known factor, the total volume of air washed was easily calculated.

There are shown in Table IV the air volume, the height of intake, the total bacterial counts, and hemolytic streptococcus findings. It will be noted that the height of the intake from the floor is the deciding factor, not only as to the total bacterial count, but also as to the presence or absence of hemolytic streptococci. While there are 214 organisms per liter of air at a height of 2 inches and one organism per liter at 2 feet, there is only one organism per 2,000 liters at a height of 5½ feet, equal in volume to three hours of respiratory air. But the most striking result is the total absence of hemolytic streptococci at a height of 2 feet or more.

TABLE IV.—*Bacterial Count per Liter of Air.*

Volume of air		Bacterial count total	Hemolytic streptococci
1.4 liters	2″ from floor.....	300 per liter of air..	35 (estimated)
2.8 liters	2′ from floor.....	17 per liter of air..	0
4.2 liters	2′ from floor.....	14 per liter of air..	0
10 liters	2′ from floor.....	40 per liter of air..	0
10 liters	2′ from floor.....	30 per liter of air..	0
10 liters	2′ from floor.....	50 per liter of air..	0
11,000 liters	5′ 6″ from floor.....	2 per liter of air..	0
14,000 liters	5′ from floor.....	3 per liter of air..	0
11,000 liters	5′ 6″ from floor.....	10 per liter of air..	0
11,000 liters	5′ 6″ from floor.....	10 per liter of air..	0

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These experiments were conducted on "streptococcus wards" in which all the beds were occupied by patients, who coughed considerably. The results of these tests show the remote possibility of infection through the air route. In addition, reference may be made to a former report in which it was shown that droplets expelled by an act of coughing or by an atomizer have not only a rapid rate of fall, but also a high dilution in the air.[4] From these findings it appears that in order to transmit infection by droplets it is necessary for one to cough directly into the face of another. I have never seen this occur in an army camp, although close observations have been made. It is an injustice to the American soldier to say that droplet infection was responsible for the high disease incidence. These men respect good manners. Let us not make the mistake of unjustly blaming the individual, for the high disease incidence was due to what may be termed mass, or collective sanitation, over which the individual had no direct control.

In Table V there is shown comparative data for the three main avenues of contagion transmission. A perusal of the percentages as here presented indicate the relative importance of the routes of distribution.

TABLE V.—*Consolidated data.*

	Dishes, per cent	Hands, per cent	Inanimate objects per cent
Streptococcus hemolyticus..	84	38	13
Pneumococcus.....	68	17	50
Streptococcus viridans.....	65.6	100	26.6
B. diphtheria.....	1.9	5.5	2.7
B. tuberculosis.....	.....	1.8	.....

THE CARRIER RATE IN SELECTED GROUPS AS DETERMINED BY MESSING CONDITIONS.

In our foregoing considerations of the several avenues of sputum-borne disease distribution, it appears that the avenue of greatest danger is at the mess. If this is so, it should be possible on a basis of messing conditions to secure corroborative evidence by a determination of the carrier rate in selected groups.

In Table V there is presented the percentages of hemolytic streptococci carriers for seven civilian and soldier groups. These differ according to age, the kind of eating utensil used, the size of the messing group, and the temperature of the eating utensil wash water.

[4] Lynch and Cumming, "Epidemiology of Influenza-Pneumonia." In Press—Modern Clinical and Laboratory Medicine.

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TABLE VI.—*The Hemolytic Streptococcus Carrier Rate in Selected Groups.*

	Per cent
158 civilian children, 6 years old, used tableware	0
164 civilians, age 14 to 17 years, used tableware	1.2
102 Malarial Drainage Detachment, used messkits washed in boiling water	5.8
216 average civilian adults, used tableware, average family groups	6.0
229 Hdqrs. Detachment, used tableware, a common mess	12.0
207 Shipyard's office force, used tableware, a common mess	20.7
422 Troops, used messkits washed in warm water	32.0

It will be noted that while no carriers were found among average children, 6 years of age, there was a carrier rate of 1.2 per cent among those 14 to 17 years of age, and that the civilian adult carrier rate was 6 per cent. In spite of the fact that all these age groups eat from tableware, there is a marked difference in the carrier rate. There should then be a difference in the influenza-pneumonia death rates for these age groups. Official records show this to be so, the rate in civilian children being lower than in civilian adults. In our recent epidemiological study of influenza-pneumonia it was found that the mortality among institutional children was several times greater than among civilian children. In institutions there is a common mess; consequently there should be a high carrier rate and a high mortality rate. In this connection it would be interesting to know the actual carrier rate among institutional children so that comparison may be made with the rate among civilian children.

The several age classes among civilians eat in small family groups of approximately four individuals each, and as the carrier rate in average civilian adults is approximately 5 per cent, there is but one carrier among five such families. So long as the individual eats within his own family group, as in the case of children, the chances of acquiring the carrier state is not great. But as the age increases, so also the activities of the individual increase, so the opportunities of infection are expanded to include promiscuous messing in other family groups, and in public eating places where eating utensils are only handwashed with no thought of sterilization. The difference in the percentage of carriers in the several age groups is, then, influenced by the age and the duration of and degree of exposure.

In regard to the prevalence of the streptococcus carrier state among average troops it may be said that in the late fall of 1917 the carrier rate for 400 troops at San Antonio was 5.5 per cent. In contrast to this rate we find, as shown in Table V, that among 422 troops examined during January and February 1919, the carrier rate was 32 per cent. Each of the above groups of soldiers belonged to four different organizations, so the results of the total examinations may be taken as a fair

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representation of the average carrier rate. Why should the hemolytic streptococcus carrier rate among soldiers increase five times within about one year? It is believed that the answer to this question is shown in Table V. It will be noted that the Malarial Drainage Detachment had a carrier rate of 5.8 per cent. The soldiers in this detachment, as all others here investigated, had been in the service over one year, and all the percentages, including those for civilian groups, show the results of investigations during January and February of 1919. In contrast to the low percentage of the Malarial Drainage Detachment, where boiling water was used for washing messkits from the time of the detachment's formation, it is found that for average troops the rate is 32 per cent. These average troops used the old line method of washing messkits in warm water. In contrast to these two groups, both of which used messkits, it is worthy of note that the Headquarters Detachment, which uses tableware, had a 12 per cent carrier rate. Why should this rate be higher than the Drainage Detachment, and lower than average troops? There was in the Headquarters Detachment promiscuous messing—a large messing group, a few carriers as the original foci and distribution to others through partially washed eating utensils. On the basis of the facility of transmission of the sputum-borne diseases at the mess, one would not anticipate as high a percentage of carriers among troops eating from tableware as among those eating from messkits washed by the old line method. When tableware is used there is only one avenue of spread—through the eating utensil; whereas when messkits are used there are two routes of travel—through the hands and messkits.

In conclusion attention is called to an army group and a civilian group, both of which ate from tableware. As shown in Table V, Headquarters Detachment had a carrier rate of 12 per cent, while the office force at the shipyard had a rate of 20.7 per cent. The detachment had been in existence one year, and although there had been promiscuous messing three times daily, the opportunity of transmission at the mess had been eliminated by the use of boiling messkit wash water. On the other hand the employes at the shipyard had been exposed at a common mess, through the use of partially washed eating utensils, but once a day—the noon meal—for a period of from five to ten years. These office employes are a special group of civilians, who have a carrier rate five times greater than average civilian adults. In this connection it would be of interest to determine whether or not other selected groups of civilians, who habitually eat their noon meal at public eating places, have a similar high streptococcus carrier rate.

The laboratory researches of the several avenues of contagion dis-

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tribution show the importance of blocking that major avenue of distribution at the eating place by the use of boiling water in the process of washing eating utensils. The researches into the prevalence of carriers in selected groups, on a basis of messing conditions, support our finding as to the importance of preventing the distribution of the sputum-borne diseases through eating utensils which are washed in warm water.

It should be appreciated that there is more promiscuous messing now than ever before; consequently there will be an increased pneumonia carrier rate. As a result of this increasing carrier rate, it is to be pointed out that in the event of a future influenza pandemic there will be an even greater mortality from the complicating pneumonias than there was in the recent pandemic. As a public health measure the investigations here reported indicate the necessity of blocking transmission of the sputum-borne infections at eating places. It is our belief that the intensification of this single measure will accomplish greater prevention than all other measures combined.

DEDUCTIONS

1. The streptococcus carrier rate is many times greater among average troops than among average civilians. The pneumonia and other complications of the virus infections are greater in the Army than in civil populations, and among troops this is due to the high carrier rate of the group of pneumonia producing organisms.

2. This high carrier rate was not due to crowding in barracks but to insanitary messkit washing incident to crowd messing.

3. The dangers incident to crowd messing can be eliminated by the use of boiling water for the washing of eating utensils.

4. Environment is a subsidiary cause of disease production. Blocking the avenues of transmission, thereby preventing infection in susceptibles as well as in immunes, is the crux of control.

5. The institution of the control methods applicable to the prevention of pneumonia will automatically control the virus infections.

6. In order of importance the eating utensil appears to be foremost as a distributing agent of the sputum-borne diseases,the hands ranking second, the inanimate object third, and the air fourth.

7. Laboratory researches, as well as epidemiological investigation in the Army and public institutions, indicate that the greatest possibility of sputum-borne transmission occurs at the mess—contaminated hands and messkits in the Army and partially washed eating utensils in public institutions, as well as in public eating places and the home. There-

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fore, the asepsis of eating utensils in the Army, in public eating places and in the home appears to be of greatest importance in sputum-borne disease prevention.

8. In the prevention of sputum-borne epidemics it is indicated, on the basis of "the theory of case and source elimination," that the universal application of the principle of eating-utensil pasteurization—thereby blocking the major avenue of distribution—will accomplish the desired end.

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SOME OBSERVATIONS ON THE USE OF VACCINES AND GLUCOSE IN THE TREATMENT OF INFLUENZA AND BRONCHO-PNEUMONIA[1]

By H. H. KOONS, M. D.

MUCH has been written and justly claimed for the use of vaccines in the prevention of disease, but comparatively little has been claimed for them in treatment. The consensus of opinion of unprejudiced observers is that they have a distinct value as a prophylactic measure in influenza and its allied pneumonia, and beyond a doubt confer immunity for a variable and undetermined length of time. The period of immunity must necessarily be of short duration owing to the fact that the disease itself protects the patient from a second attack, in many instances, but a short time. No more could be expected of a vaccine. A physician or nurse constantly exposed to contagion during an epidemic should have a prophylactic dose at short intervals—from six to eight weeks.

What I wish especially to call attention to in this paper is the use of vaccines in the treatment of broncho-pneumonia, for I am convinced that their value is of extreme importance in this field and that they are by far the greatest life-saving factors of which I have any knowledge.

During the pandemic of 1918 I was on duty in Base Hospital No. 1, of the Southern Department, at Fort Sam Houston, Texas. In a department base hospital a large percentage of your patients come in from camp hospitals and infirmaries with the disease well established, and the problem confronting the internist is a difficult one. Only those who have seen ward after ward jammed with these desperately sick men know what an appalling sight it is, and the feeling of utter helplessness of the physician responsible for the lives of these men is beyond expression. During the epidemic I had charge of from three to five wards full of influenza and pneumonia patients and had ample opportunity to observe and study the various phases of the disease and the different methods of treatment, and my conclusions are that the most valuable aids we have are vaccines and the intravenous use of glucose.

In spite of much adverse criticism and little praise for glucose, I have become a firm believer in its efficacy, having used it hundreds of times with beneficial effects, and have seen desperate cases apparently saved by its use.

In serious cases of shock or exhaustion, following injury or operation or serious illness, glucose is invaluable.

[1] Read at the Los Angeles County Medical Society, February 5, 1920.

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Having studied and experimented with vaccines for a number of years and demonstrated to my satisfaction their usefulness, I have also learned much of their limitations and do not expect the miraculous results often promised by over-enthusiastic advocates. In my private practice I have used them for the past five years in the treatment of influenza and broncho-pneumonia with uniformly good results. But as they are not endorsed by the profession generally as remedial agents, I hesitated to use them in the army hospital at the beginning of this epidemic, and gave them at this time only to a few selected cases in which ordinary treatment was of no avail. As the good results were noted their use became more general, although they were never used routinely in my wards, but were given only after thorough examination and study of the patient and other than ordinary treatment seemed indicated.

Vaccines, as developed today, should not be looked upon as specifics but as valuable adjuncts to treatment. They are a powerful factor in limiting the extent of the infection, of hastening crisis, and an early convalescence, and at the same time very materially lessen the number of serious sequela so frequent in this epidemic (empyema, phlebitis, neuritis, sinusitis, ottitis media, and mastoid infection). In one hundred cases treated with vaccine there developed but one case of mastoid, one of phlebitis, and one case in which 420 c.c. sterile fluid was withdrawn from the chest. There was not one case of empyema, although we had as high as 18 per cent empyema in some of our pneumonia wards. I have given vaccines in very severe cases—those which do not respond to ordinary treatment; those which improve to a certain point and continue with a temperature ranging from 100 to 102° for days, without sufficient physical signs to justify their rise im temperature. In the majority of these last-mentioned cases where there is no demonstrable lesion, one injection of vaccine will bring the temperature down to normal within thirty-six hours, and it will remain normal. One reason that vaccines have been condemned in treatment is that men look for immediate results, failing to realize the fact that no improvement should be expected until the antibodies, elaborated in the system in response to the irritant, appear in the blood, and the clinical result is noted in thirty to thirty-six hours.

There is no rule of thumb in the administration of vaccines. The physician must study the case and use his judgment as to the vaccine to use, the dosage indicated and the proper time to give it. In adding toxins to an already toxic system the first result is, naturally, an increase in temperature and in the general toxic condition, and it is quite apparent how an over-dose might overwhelm a patient. The initial

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dose must be very carefully estimated, gauged by the condition of the patient, based on temperature, pulse and respiration and general toxic condition. If given at his maximum temperature a very small dose will suffice to show reaction and raise temperature one-half to one degree. In the ordinary case of influenza and broncho-pneumonia, a marked drop in temperature, pulse and respiration may be expected within thirty-six hours after the initial dose, and subsequent doses must be gauged by reaction due to initial dose.

In hemolytic streptococcus pneumonia and in frank lobar pneumonia, especially in Type I, vaccines are less indicated but still have some value. Whether you class broncho-pneumonia as a mixed infection or not, the fact remains that, while you may find a single strain of infectious organism in lung puncture and assume it to be the exciting cause of the disease, the sputum in the same case will be swarming with a variety of pathogenic organisms, and it is reasonable to assume that they are doing their part toward the progress of the disease; and if we are able to counteract the toxic effect of any one or more of these infecting organisms, we are relieving the over-burdened system of that much of its load, and it may be sufficient to tide the patient over his critical stage. This is one answer to the men who condemn vaccines offhand on the ground that we are uncertain as to the specific organism causing the epidemic and can have no specific vaccine. When we confine ourselves to absolute specifics, the armamentarium and usefulness of the physician will be very limited.

In Type I pneumonia use the antipneumococcic serum Type I freely until you get results. In hemolytic streptococcus pneumonia use antistreptococcic serum incorporated in glucose solution, which is indicated in all these cases. In my wards glucose was given in 10 per cent solution, 250 c.c. intravenously as often as indicated. In many cases I have used it every six to eight hours for several days without noting any deleterious results other than a chill which frequently follows intravenous medication. This disagreeable occurrence may often be avoided by incorporating an eighth of a grain of morphine in the solution. Following the administration of glucose the patient usually feels soothed, his tense muscles relax, his pulse rate drops, and he passes into a refreshing sleep. This sleep is not necessarily due to the morphine, for the same result will follow the use of the morphine-free solution.

As to the relative merits of the various polyvalent vaccines, I have nothing to suggest. The one selected should be fresh and prepared by a reliable laboratory.

This is intended neither as a scientific nor as an exhaustive treatise

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on vaccine-therapy, but is a simple statement of some of the clinical observations and results noted in rather a large series of cases treated by vaccines, in the hope of interesting the profession in what I believe to be the most potent agent we have in combating this deadly foe.

The complete case reports and accurate laboratory findings which I should like to give you are not available because they do not exist. This institution, like many others, was swamped by the sudden and overwhelming onset of this epidemic, and the recording of accurate data was a physical impossibility.

Our series embraced 8,000 cases of influenza and 1,000 cases of pneumonia. The relative high percentage of pneumonia is explained by the fact that many of our cases came in from camp hospitals and infirmaries which cared for their own influenza cases. The pneumonia mortality record for the entire series was 18 per cent, while in the wards where vaccines were used the mortality rate was under 7 per cent. In one series of 200 cases not treated with vaccine, fluid developed in 25 per cent of the cases; 18 per cent came to operation for empyema.

In the last series of 50 cases of pneumonia treated with vaccines, two died during acute stage and one following mastoid operation. There was not a single case of empyema. These patients were treated in warmed, well-ventilated wards, carefully protected from chilling by draughts or unnecessary examinations. Probably no fad in medicine has accounted for more deaths than the open air treatment of pneumonia.

CONCLUSIONS

1. That a prophylactic dose of vaccine will confer immunity for from six to eight weeks.

2. That as a remedial agent, vaccine, if given at the onset, will materially shorten and lessen the severity of the attack and pneumonia will be a rare occurrence.

3. That vaccine given to a pneumonia patient will ameliorate the severity of the symptoms, hasten crisis, and cut the number of serious sequala to a minimum.

4. That glucose, intravenously, combats accidosis, gives nourishment to the heart muscle, adds fluid to the body, and has a decided diuretic action.

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WHY AN AVIATOR IS EXAMINED BY THE REBREATHING METHOD AND HOW OFTEN THE EXAMINATION SHOULD BE MADE

By Lieutenant VERNER T. SCOTT
Medical Corps, United States Army

TWO of the questions most frequently asked by those not familiar with aviation medicine is, "How do rebreathing conditions simulate high altitudes and how can you determine an aviator's limit in altitude by examining him on a rebreather machine at sea level?"

A brief statement concerning altitude physiology is necessary to appreciate the principle of the rebreather. It was Paul Bert in 1878 who first found that it was the decrease in the partial pressure of the oxygen of respired air that caused the symptoms of mountain sickness. Since that time it has been clearly proved that a decrease in the partial pressure of the oxygen of respired air regardless of the method of reduction produces the symptoms appearing at high altitudes.

There are three methods used at the Medical Research Laboratory (Air Service, Mitchel Field, L. I.) to reduce the partial pressure of oxygen: (1) the rebreather machine, (2) the low pressure chamber, and (3) the nitrogen dilution apparatus (Air Service, Medical, 1919).

The low-pressure chamber is a cylindrical steel tank with a capacity sufficient to hold six people. The reduction of pressure is brought about by means of a motor driven vacuum pump capable of rarefying the atmospheric pressure equal to that found on any altitude flight.

Unfortunately there are some who still believe that altitude symptoms are produced by the effect of the lowered barometric pressure on the surface of the body. Schneider, working in this laboratory, confirmed the work of Paul Bert by a number of experiments. He placed two men in the low-pressure chamber, one supplied with oxygen and one without oxygen. The subject taking oxygen during the experiment remained as comfortable and as efficient as at sea level, while the subject without oxygen experienced an increase of pulse and respiration, and became cyanotic and mentally inefficient. In fact, this point is demonstrated daily. The clinician who accompanies every subject in the low-pressure chamber is supplied with oxygen through a rubber tube with a wooden nipple. He holds this nipple in his mouth in the same manner a cigar is held, and during the experiment he remains perfectly comfortable and efficient while the subject undergoes the compensatory reactions incident to reduced partial pressure of oxygen.

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The rebreather machine is used for the official classification of aviators because of its simplicity and ease of operation. An aviator rebreathes into a metal tank by means of a mouthpiece and two corrugated rubber tubes. The carbon dioxide is removed by a caustic soda container in the expiration pipe. The oxygen percentage in the mixture grows progressively less. Starting with 52 liters of air the average subject will reduce the oxygen to 7 per cent in 30 minutes.

A comparison of the analysis of alveolar air found at different levels of rarefied air with that on the rebreather with their corresponding partial pressures will be of interest:

LOW PRESSURE CHAMBER [1]

Alveolar air	Barometric pressure	Alveolar partial pressure
760 mm.	Oxygen....14.5 per cent.	(760–40) = 104.80
Sea level.	CO_2..... 5.5.....	(760–40) = 39.60
560 mm.	Oxygen.....14.0 per cent.	(560–40) = 72.80
10,000 ft.	CO_2..... 7.0.....	(560–40) = 36.40
350 mm.	Oxygen....13.0 per cent.	(350–40) = 40.30
20,000 ft.	CO_2.....10.5.....	(350–40) = 32.55
	Rebreathing machine	
21.95 per cent.	Oxygen....14.5 per cent.	(760–40) = 104.40
Sea level.	CO_2..... 5.5.....	(760–40) = 39.60
14.2 per cent.	Oxygen....10.0 per cent.	(760–40) = 72.00
10,000 ft.	CO_2..... 4.5.....	(760–40) = 32.40
9.7 per cent.	Oxygen..... 5.6 per cent.	(760–40) = 40.32
20,000 ft.	CO_2..... 4.5.....	(760–40) = 32.40

Partial pressure of alveolar air = barometric pressure minus vapor tension (40) x per cent of gas

Whereas in altitude flights the partial pressure of O_2 is reduced by a lowering of barometric pressure, so it is seen that the same thing is accomplished on the rebreather machine by decreasing the percentage of oxygen.

Classification of the aviator by the rebreathing method clearly defines the altitude or low oxygen tension which he can tolerate and still remain mentally and physically efficient.

Providing he is in good physical condition at the time of the test, the subject will not be able to raise his limit by repeating the rebreathing test. Practice on the rebreather does not increase one's tolerance

[1] Luts and Schneider, *American Jour. Physiology*, Vol 1, No. 3, December, 1919

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for low oxygen. This has been demonstrated by the men connected with the Medical Research Laboratory. There have been some who, for experimental purposes, have taken the test two or three times a week for months and have found their last test no lower in oxygen than some earlier ones.

Just as some men are more resistant to disease than others so do we find some men more resistant to low oxygen than others.

Different aviators in good condition vary in their ability to reach low oxygen. Some reach 6 per cent, others 8 per cent oxygen.

Subjects in poor condition will range from 13 per cent to 9 per cent. The causes which lower the "ceiling" of air men are acute and chronic diseases, staleness and lack of exercise plus loss of sleep, plus excesses. The importance of physical exercises and regular habits to the air is apparent. At one time there was a tendency to under-estimate the value of the rebreathing classification because there were occasions when a man who, being limited to a certain altitude, exceeded this limit and returned without unpleasant experiences.

There are two reasons for this, either (1) his "ceiling" was established when not in very good condition and his flight taken when in better condition, or else (2) he was within the safety margin. He is given an altitude within which he will remain his best. He may at times exceed this limit, but not within danger.

In view of our increasing knowledge and experience in aviation medicine, we believe an aviator's tolerance for low oxygen should be established in all cases before he is permitted to fly, at least once a year thereafter, and always after any serious physical or mental illness.

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A CASE OF GANGRENE OF THE TOXIC AND EDEMATOUS TYPE DUE TO THE WELCH BACILLUS[1]

By JOHN H. JOPSON, M.D.

OUR knowledge of the etiology, pathology and treatment of infectious gangrene due to gas-producing organisms of the anaerobic type has been vastly added to by the experience derived by pathologists and surgeons during the recent war. Up to that time the experience of surgeons was usually confined to a few cases personally seen and treated, and to the study of casual reports of what was to a certain extent a surgical curiosity, sufficiently rare for each case to be noted and reported upon by those of an inquiring turn of mind. It unfortunately fell to the lot of those operators serving in France to increase their observations twenty-five, fifty or a hundred fold. At the same time the efforts of laboratory workers were quickened and stimulated to develop a serum treatment which would be a reliable adjuvant to the surgical treatment which was gradually evolved by the intensive study of this frequent and frightful complication of a large percentage of soft part wounds. This intensive study on the part of a large number of workers, whose efforts were spurred on by every consideration of patriotism and humanity, could not fail in this, as in many other fields of traumatic surgery, to bring forth results which will be of permanent benefit to the world at large. We find that both in the operative treatment and the serum therapy of emphysematous gangrene great strides have been made, and that we are in a position today to recognize and to value at their respective worths both of these methods of treatment, once the infection has developed. As to the prophylactic value of the serum treatment, it is difficult to make an estimate, as the observations on a large scale of the early systematic administration of the serum were not begun until late in the war, and we have seen no published analysis of the results obtained. The studies of Bull were mainly in the direction of providing a serum potent against infection by the *Bacillus aerogenes capsulatus* of Welch, or the *Perfringens bacillus*, as it was commonly designated by the French. At the same time Weinberg who has contributed so extensively to our knowledge of the anaeroids, and Seguin were interested in the production of a polyvalent serum, which would be available in the treatment of other types of anaerobic infection, whether occurring together with the perfringens or singly, especially the *B. oedematiens* and the *Vibrion septique*. While the

[1] Read before the Joint Meeting of the New York Surgical Society and the Philadelphia Academy of Surgery, Philadelphia, February 5, 1920.

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Welch bacillus was the most common anaerobe identified in gas gangrene, these other types were observed with sufficient frequency to demand recognition, besides a large number of greater rarity or of little virulence. In addition to the polyvalent serum, a special serum, had been obtained for the *B. oedematiens* above, but was not in general use. The Germans also had an anti-gas serum which was contained in some of their captured field kits in 1918, the labels on which described the method of administration, but made no great claims for efficacy. While the Bull serum (anti-Welch) was obtainable in the latter part of 1918 in safe and convenient form for administration, the polyvalent serum of Weinberg and Seguin had not obtained the recognition generally of the French or the confidence of the laboratory chiefs of the American forces. That a polyvalent serum is desirable where cases of more than one variety of anaerobic injection are liable to be met with, either in civil or military practice, is indicated by the case which we here desire to place on record. It was reported at the Societe de Biologie, July 26, 1919, by Dr. Weinberg for Dr. Theodore C. Beebe, who saw and studied it with me, and I am indebted to these gentlemen for permission to publish it in this country.

Pvt. C. D., Infantry, was admitted to Evacuation Hospital No. 1, A. E. F., on October 20, 1918, with multiple gunshot wounds (machine gun or rifle) of the left thigh and the left heel and ankle. The thigh wound was in the middle third, outer aspect, perforating, of large diameter, dividing the vastus externus muscle. That of the heel and ankle, also perforating, was associated with a compound fracture of the tuberosity of the os calcis, and a laceration of the tendo Achillis. X-ray examination showed the thigh wound free of foreign bodies of a metallic nature, but a large piece of the jacket of a bullet, and several smaller fragments were lodged in the heel and ankle.

Operation was performed nine hours after receipt of wound. The usual debridement was carried out. In the thigh double incisions were made and the tract excised. No sutures were used. In the heel wound an L-shaped incision exposed the wound in the heel and ankle, foreign bodies and bone fragments were removed, the tendo Achillis and its attachment to the separated extremity of the os calcis were preserved, the soft parts debrided, and both wounds were packed with gauze for twenty-four hours and then subjected to the Carrel-Dakin treatment. For ten days the post operative course was uneventful. Smears and cultures made October 21, the day after operation, showed: left thigh, posterior wound, *B. Welchii*, unidentified anaerobe, 3 per field; anterior wound, B. tertius, diphtheroids, staphylococcus, 10 per field. Left foot, *B. mesentericus*, staphylococcus unidentified anaerobe; October 25, smears, left thigh, 9 per field; left foot, 1 in 12 fields. Eight days after operation no Gram-positive bacilli were present. No complications or untoward symptoms were noted for ten days, when an evening rise of temperature first appeared, accompanied by pain in the thigh, and on November 1 examination of the posterior wound at the daily dressing showed an induration at its lower end, with a slight watery secretion. Cultures on this date showed a few cocci in pairs and staphylococcus albus on the posterior wound, and cocci in chains with the staphylococcus albus on the anterior thigh wound,

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also an unidentified anaerobe. On November 2 the patient's condition was much changed for the worse. The temperature was 100° to 102°, the pulse rapid, and much pain was complained of in the thigh. There was an extensive induration over the posterior surface of the limb at the site of the wound and extending upward to the buttock on the same side, but most marked around the wound. Secondary operation the same day. The posterior surface of the thigh was opened through the wound and the indurated area by long incision. There was great swelling and edema of the subcutaneous tissues and of the intermuscular tissues as well. The muscles were the site of a necrosis of peculiar appearance, entirely different from that commonly seen in gas gangrene of the type with which we were familiar. They were greatly indurated, the cut surfaces anemic, mottled and homogeneous, on section cutting almost like cartilage. Muscular contractility was lost, no gas was present in the tissues, and odor was practically lacking. As a streptococcus infection had been anticipated, we were much puzzled by this unusual and, in our experience, unique appearance. A limited excision of the muscle surfaces and extensive intermuscular dissection of the different planes to facilitate drainage was done. Cultures were made by Captain Beebe, who had requested at this time that he be summoned for all cases of gas gangrene, and portions of the excised muscle tissue were sent to the laboratory. Edematious infection was suggested by Captain Beebe. Operation was poorly borne by the patient, who was sent to the shock ward.

The following day the patient's condition was poor. The temperature was normal, and the mind clear, but he was very restless, the skin and mucous membranes pale, the former of a yellow tint, the pulse rapid and feeble, while vomiting occurred at frequent intervals. The wound was the site of a profuse watery drainage, and there was now a gangrenous odor to the discharge. The induration persisted to the same extent as before. Examination of the hanging drop of muscle serum, and of smears taken at the time of operation, and the clinical appearance had led Captain Beebe to regard the infection as probably due to the *Bacillus oedematiens*, and an ampoule of anti-edematiens serum, which he had obtained shortly before for laboratory use, was injected. The soldier died suddenly the same day during his dressing, consciousness being preserved until just before death. At autopsy the findings were similar to those at operation: Extensive edema of the subcutaneous and inter- and intra-muscular tissues, and a dense induration of the muscles on the outer and posterior surfaces of the thigh, with a necrosis apparently not universal, but in small scattered darker patches throughout the muscles.

Bacteriological Report.—As already mentioned, the examination at the time of the second operation showed in hanging drop thick bacilli of different dimensions, the immobile ones resembling *B. perfringens* or *B. oedematiens;* others, mobile and longer, apparently of another variety. The bacilli were Gram-positive on staining, and the absence of cocci and of leucocytes indicated the lack of resistance on the part of the patient and was an index of the gravity of his condition. Cultures from the muscle serum showed two organisms, an anaerobe, which was later identified as *B. perfringens*, and an aérobe, the *B. anthricoides*. Further studies made in Professor Weinberg's laboratory confirmed these findings.

A peculiar interest attached itself to this case for several reasons. In the first place it was the only case of its kind observed, as far as our knowledge goes, at Evacuation Hospital No. 1, and our experience covered most of the period of activity of that hospital. In its long-delayed development, pathology, and constitutional symptoms and

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clinical course, it was strikingly different from ordinary cases of gas gangrene. At this time Captain Beebe was particularly interested in the search for oedematiens infection, by reason of the frequent reports of its presence in the hospitals of the Paris district. While the preliminary examination apparently confirmed the suspicions aroused at the time of the second operation, and the oedematiens serum was accordingly administered, the cultures failed to show other than the Welch and anthricoides organisms, and it remained for Weinberg to properly group this case as one of a rare type, to which he had called attention. Two similar cases have been observed and reported, the first by Weinberg himself at Depage's hospital at LaPanne, and the second in the service of Chutro at the Hôpital Buffon in Paris. The first mentioned was fatal. The latter case recovered after treatment with serum.

I cannot improve on the language in which Dr. Beebe draws his conclusions:

The bacteriological study of this case shows that our patient had been affected by the toxic or edematous gas gangrene caused solely by the *Bacillus perfringens*. He furnishes a new proof of the fact that the toxic form of gas gangrene is not due to a single species of microbe, but that the clinical syndrome may be provoked by different anaerobes. The mistake which we made in treating the case by the anti-oedematiens serum pleads in favor of treatment of all cases of gas gangrene by the mixed serum, such as is recommended by Weinberg and Segúin. In effect, even when the gas gangrene is caused by a single species, it is difficult to make an extemporaneous diagnosis of the pathogenic agent of the disease, but nevertheless it is necessary to have immediate recourse to serum treatment if one wishes to save the patient.

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A REPORT OF WOUNDS INVOLVING THE HEAD AND SPINE CARED FOR AT EVACUATION HOSPITAL NO. 8, A. E. F.

By Lieutenant ADOLPH M. HANSON
Medical Corps, United States Army

THIS report includes all wounds of the head and spine cared for at Evacuation Hospital No. 8 from June 6, 1918, to and including November 28, 1918.

Total number recorded	[1]493
Total number reported to the Surgeon General, U. S. A.	460
Total number classified	449
Lower orbit, face, and jaw injuries, not classified	11

SCALP WOUNDS

Scalp only	136
Deaths	0
Scalp (wounds elsewhere)	77
Deaths	8
Mortality (wounds elsewhere), per cent	10.4
Total mortality, per cent	3.7

SKULL FRACTURES (DURA INTACT)

External table	31
External table (wounds elsewhere)	3
External and internal tables	54
External and internal tables (wounds elsewhere)	14
External and internal tables (inoperable)	1
Total operated	102
Total operative deaths	4
Operative mortality, per cent	3.9

PENETRATING CRANIO-CEREBRAL, CRANIO-CEREBRO-SINUS, AND CRANIO-SINUS INJURIES

Penetrating cranio-cerebral and cranio-cerebro-sinus	82
Pentetrating cranio-cerebral (wounds elsewhere)	1
Penetrating cranio-sinus (cerebrum intact)	3
Inoperable	3
Total	89
Total deaths	38
Total operative deaths	35
Operative mortality, per cent	39.3
Total mortality, per cent	44.2

SPINAL INJURIES

Bony Spine Only

Cervical	7
Dorsal	1
Lumbar	1
Not specified	2
Not specified (wounds elsewhere)	1
Total	12
Deaths	0

[1] The records of 33 are so incomplete as to be worthless and have not been used in the classified tabulation.

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Spine and Cord

Cervical	4	Total operative deaths	15
Cervical (inoperable)	3	Mortality bony spine only, per cent	0
Dorsal (wounds elsewhere)	2	Mortality spine and cord, per cent	71.8
Lumbar	5	Operative mortality spine and cord, per cent	62.5
Lumbar (wounds elsewhere)	3	Total operative mortality (bony spine only and spine and cord), per cent	34.1
Not specified	6	Total mortality, per cent	52.3
Not specified (wounds elsewhere)	4		
Not specified (inoperable)	5		
Total	32		
Total inoperable	8		
Total deaths	23		
Total operated	24		

OPERATIONS

Excision of scalp with exploration of Skull	213	Decompressions	15
Deaths	8	Deaths	4
Mortality, per cent	3.7	Mortality, per cent	21.4
Trepanations of skull	105	Laminectomies	18
Deaths	33	Deaths	13
Mortality, per cent	31.4	Mortality, per cent	72.2

The results tabulated[2] include all information that I have been able to secure by sending out letters to home addresses and by checking up with army records as completely as possible those that died after evacuation and up to January 1, 1920. The technique followed is that described by Dr. Harvey Cushing in the *British Medical Journal* of February 23, 1918, with the exception that ethyl alcohol was left in the track in the brain instead of dichloramine-T with eucalyptus oil and the use of a dural separator[3] and bone elevator for the internal table following the use of the drill, which greatly facilitates the cutting out of a block of bone and prevents tearing of the dura.

In a general way the technique followed at Evacuation No. 8 was as follows:

After excision of the scalp wound and the completion of a tripod, Isle of Mann, or crucial incision, trepanation of the skull was performed always in cases with depressed fractures or about an opening formed by a missile. The wound was then swabbed out with ethyl alcohol, including the dura, soiled instruments laid aside, gloves changed, and sterile towels tucked over the edges of the wound and secured by skin clips. No attempt was made to excise the edges of the torn dura. Then the patient was asked to cough, and very often much pulped brain substance and pieces of indriven bone were extruded. A soft rubber catheter was then passed through the opening in the dura in a search for pieces of indriven bone and steel fragments or bullet. When located with the

[2] Mortality figures have been computed regardless of complications: wounds elsewhere, "gas" infection, etc.

[3] Dural Separator and Bone Elevator for Craniotomy, Hanson: *Journal A. M. A.*, September 13, 1919, Vol. 73, p. 853.

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catheter, they were removed with the aid of an esquillectomy forceps. From time to time the track in the brain was irrigated with warm sterile deci-normal saline solution through the catheter removing debris and pulped brain substance. When no more foreign bodies could be felt, a little ethyl alcohol was injected through the catheter on being withdrawn. The wound was again carefully swabbed out with ethyl alcohol and the scalp closed in layers. Interrupted No. 2 chromic gut sutures were placed in the galea and interrupted silk sutures in the scalp. The silk sutures were removed in three to four days.

Whenever possible, vessels of the dura and pia found bleeding were ligated with fine silk; but in cases coming to operation thirty-six to seventy-two hours after injury was received, thickening and friability, due to inflammation, rendered it easier to control such hemorrhage by applying small silver clips.

Small perforations or tears of the sinuses were controlled by muscle graft, and large tears by applying a piece of pericranium over the rent in the sinus, keeping it in place gently with the gloved fingers for two minutes. This effectually controls the hemorrhage, adhering like a postage stamp to a letter. It produces a rapid clotting, and the resulting thrombus completely blocks the sinus well beyond the margins of the injury.

In a subsequent article I will report a series of cranio-cerebral injuries, describing each operation in detail. This is a brief summary of a certain class of injuries treated in an evacuation hospital in the zone of the advance.

CONCLUSION

1. Head injuries should be operated as early as possible.
2. All injuries of the head should be operated under local anesthesia unless complicated by wounds elsewhere.
3. Excision of a scalp wound should always be done and the skull explored for a fracture, as often the small and apparently trifling scalp wounds reveal a perforation of the skull.
4. Foreign bodies in the brain should always be removed, if possible to do so without producing added injury to the brain, and in a silent area, even though more of the brain must be destroyed.
5. The scalp should always be closed in two layers, using interrupted sutures.
6. Patients with penetrating cranio-cerebral injuries, after operation, should not be moved for six weeks.
7. Wounds of the spine with a complete severance of the cord should not be operated.

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8. Patients with or without complete severance of the cord should not be catherized, as infection invariably and promptly follows.

9. The mortality in wounds of the spine, even when the cord is not severed or only slightly injured, is high because of the frequent complication of abdominal and chest wounds.

ACKNOWLEDGMENTS

I wish to acknowledge my obligations to Col. Harvey Cushing, Col. J. F. Hall, Lieut. Col. Arthur M. Shipley, Lieut. Col. A. Weeks, Lieut. George Cronan, Capt. George E. Alleman for his X-ray studies, and to the doctors, nurses and enlisted personnel, without whose help this work would have been imposible.

Lieut. Col. Alanson Weeks, Chief of Surgical Team No. 50, and Lieut. John H. Woolsey were attached to this service temporarily with Evacuation Hospital No. 8 during the Chateau Thierry and Argonne fighting.

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REPORT ON THE ECONOMIC CONDITIONS OF THE POORER POPULATION OF THE CITY OF TRIER, AS DETERMINED BY HOUSE TO HOUSE VISITS

By Colonel EARL H. BRUNS
Medical Corps, United States Army

(With one illustration)

TO OBTAIN definite information concerning the living and health conditions of the poor people of Trier, especially with reference to the effects of the war, the homes of over 1,000 families were visited by German-speaking nurses from the U. S. Army Nurse Corps. The American nurses were accompanied by German Social Welfare nurses from the city of Trier dispensary, and the poorer families in the various streets were selected. The population of Trier is 53,899 (1917 census). It is one of the larger cities in the Mosel Valley, the principal industry of which is the raising of grapes and the making of wine. Until recent times this part of Germany has been more or less isolated, and owing to this there has been considerable intermarriage which, coupled with relative more poverty and the consumption of alcohol, has led to a population of reduced statue, physique and health stamina. We are told that the poor people are not as cleanly about their homes as in other parts of Germany. The incidence of tuberculosis is comparatively higher in this region than in the remainder of Prussia. As the amount of tuberculosis is a good index of the living conditions of a civilized people, we would expect to find, in Trier, room for improvement in this respect. The effect of the war is taking brother, husband and father away from the home, and throwing extra and unusual work on the women, we would anticipate a neglect in the cleanliness of dwellings and the care of children for this reason alone.

The principal industry of the city of Trier is the handling of wine. In addition to this some manufacturing is done on a small scale. There are several small breweries, a rag factory, where rags are sorted and prepared for the manufacture of paper, a small glass factory, pottery, cigarette factory, etc. In the rag factory a nurse is in constant attendance, and there are certain regulations with reference to the hygiene of the employes. In addition to earnings from employment, the poor people are protected by sickness, accident and invalid insurance and uu-employment pensions. All employes with less than a yearly income of 4,000 marks are required to carry insurance of which they pay two-thirds and their employer one-third. In case of sickness they receive appropriate treatment and monetary assistance until they are able to return to

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work. As soon as it becomes apparent that they are to be premanent invalids they pass under the invalid insurance, which also provides for the care of old people. Accident insurance only applies to injuries. Germany in this way probably does more than any other country for the man on small pay who is unable to lay aside any money. At the beginning of the armistice, a non-employment pension varying from (1) one to (4.50) four and one-half marks per day was started for those completely unable to work. In February, 1919, at the time of this investigation, there were 450 unemployed in Trier, and it was estimated that 150 more had not applied for assistance. Supplementing these, we have the war pensions for the dependents of deceased or imprisoned soldiers and those disabled in the war.

One of the chief motives for undertaking these investigations was to determine the effects of the war ration on the health of the poor people. In the early part of 1915 the whole of Germany was placed on a war ration. This consisted of 30 gms. of fat, 100 gms. of meat, 20 gms. of sugar, 7 pounds of potatoes and 4 pounds of war bread per person per week. The caloric value of the average daily amount of food which each person consumed in peace times had been reduced from 3,000 to 1,400 calories. Through the illicit traffic in food, the rich man, and even the man of moderate means, was able to obtain extra food, but not so the poor.

The following is a résumé of the investigations:

Number of families visited	1,017	Number with seven people	138
Number with two people	10	Number with eight people	104
Number with three people	90	Number with nine people	74
Number with four people	148	Number with ten people	77
Number with five people	208	Number with eleven people	5
Number wi sixth people	159	Number with twelve people	4

Average number of rooms occupied by families	3.52
Number of homes in which sanitation was good	609
Number of homes in which sanitation was poor	4.08
Average number of living children in each family	4.08
Average number of dead children in each family	2.07
Number of families with one child	76
Number of families with two children	149
Number of families with three children	182
Number of families with four children	158
Number of families with five children	142
Number of families with six children	100
Number of families with seven children	82
Number of families with eight children	49
Number of families with nine children	21
Number of families with ten children	51
Number of families with sickness at time of visit	757

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Number of families with history of tuberculosis	282
Number of families with some member with tuberculosis	379
Number of cases of pulmonary tuberculosis in all families visited	343
Number of cases of scrofula in all families visited	249
Number of cases of other forms of tuberculosis in all families visited	43
Father with tuberculosis	104
Mother with tuberculosis	120
Children with tuberculosis	395
Average earnings of all families, per week, marks	61.02
Average cost of living of all families, per week, marks	51.89
Number of families earning less than 200 marks per month	719
Number of families earning more than 200 marks per month	298
Number of families with personal cleanliness good	701
Number of families with personal cleanliness poor	316

The average meals of each family consisted of the following:

Breakfast.—Coffee substitute (no milk, sugar at times), marmalade (made from beets), war bread.

Dinner.—Potatoes and green vegetables (meat on Sundays; some families had horse meat twice a week).

4 *p. m.*—Coffee substitute, war bread, marmalade.

Supper.—War soup, war bread.

Considering the distribution of tuberculosis by streets (see chart at tached) it is noted that 52 cases occurred in one street (Krahnen Strasse), and from 21 to 30 in three others (Maar, Weberbach and Neu). These streets include the homes of more of the extremely poor class. Krahnen Strasse, in which 52 cases were discovered, contains a large number of overcrowded tenement houses in which the sanitary conditions are very bad.

The results of these visits brings to our attention, in a way not to be questioned, the suffering of the poor as a result of the war. The visiting nurses frequently found the children locked in the homes while the mother was away working. The picture usually presented was a small three-room apartment in an overcrowded tenement house poorly ventilated and poorly lighted. In the kitchen was the only stove, and here the family lived. In one or two very small, dark bedrooms the family slept, and one wondered at times where they all found a place to lie down. A small oil lamp in the kitchen was the only light at night. There was usually no running water in the building, and one toilet in the hall-way sufficed for all the families on that floor. The size of the families was another feature. Almost half of them had five or more

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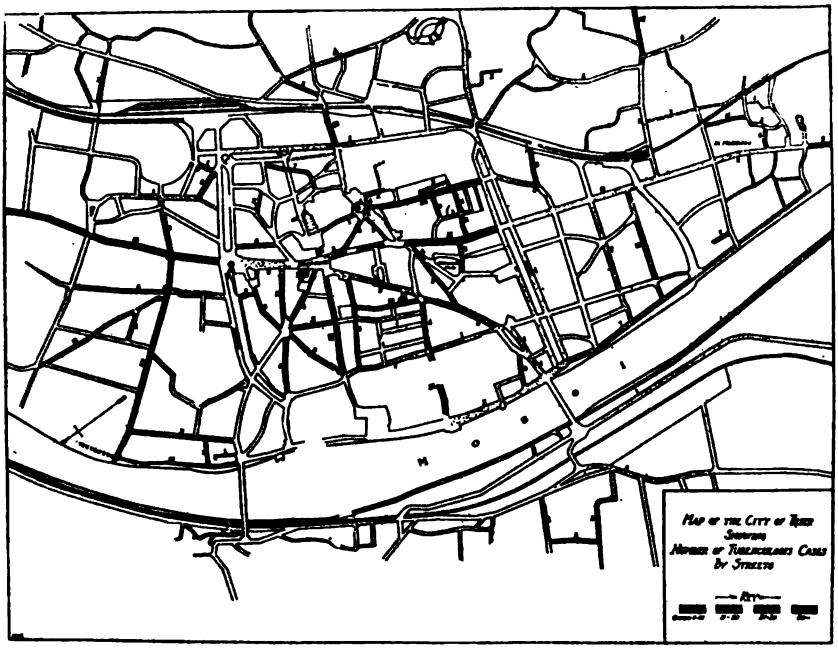
children. The amount of sickness was also striking. In three-fourths some member was sick. Scrofula and rickets was very common in children; pulmonary tuberculosis and influenza in adults. The proportion of tuberculosis, however, gives a false impression. The diagnosis of scrofula had often been made by the family physician, who is inclined to pronounce every anemic child, undernourished, undeveloped, and with palpable glands, as scrofulous. While such an array of objective symptoms is very suggestive, it does not always mean scrofula. The visiting nurses being in association with the German nurses from the dispensary, many poor families known to them through sickness would



naturally be visited which included most of the tuberculous families under the supervision of the dispensary. The visits nevertheless showed the frequency of tuberculosis, also the infected surroundings and the kind of human material which would prove easy victims to the tubercle bacillus. As previously discovered in examining school children, malnutrition, as a result of the war ration, was becoming very common among the poor. Mothers wept as they told our nurses how they must put their children to bed hungry at night and send them to school hungry in the morning.

The earning capacity of the family included not only wages, but in-

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surance money and pensions. The cost of living only comprised rental and cost of food. In other words, by subtracting the average cost of living from the earnings, each family had on an average 9.23 marks a week to spend for clothing, extra food, wine, beer, tobacco, etc. It was found that very few families, owing to the high price of wine and the poor quality of beer, used alcohol in any form. Poor personal cleanliness was noted for about one-third of the families. The explanation usually given was lack of soap, the expense of new clothing and the working out of the mother. The mother who worked all day came home too fatigued at night to devote much time to the tidiness of her home and the care of her children. Some families had been unable to purchase any new clothing or shoes since the beginning of the war. Great difficulty has been found in taking care of the sick. In this connection the dispensary has been doing excellent work, helping the mothers, supplying medicines, money and extra nourishment. The German system of food distribution permits of a certain amount of milk and better bread to the sick, also milk to nursing mothers and babies.

As a result of visiting the homes of a large number of poor people, we are convinced that the war has brought tremendous hardships on the poor people in the city of Trier. Due to overwork, neglect of homes and children, and especially the war ration, disease, especially tuberculosis, has increased among this class.

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THE TREATMENT OF WEAK OR FLAT FEET WITH REPORT OF A NEW COMBINATION FOOT SUPPORT

By Captain JOHN CARLING
Medical Corps, United States Army

(With three illustrations)

THE successful treatment of weak or flat feet is dependent on a thorough knowledge of the anatomy and functions of those members.

The foot consists of twenty-six small bones, bound together by ligaments and controlled by groups of muscles. Nature has provided a large number of small bones in order to insure flexibility and spring to the step. The ligaments of the foot are strong and numerous and bind the bones together to form the arches, while the muscles supply strength and motion.

The arches of the foot are (*a*) the longitudinal or principal arch, and (*b*) the anterior or transverse arch (Fig. 1). The longitudinal arch lies along the inner and underside of the foot, between the heel and the head of the first metatarsal bone. The highest part of this arch is at the junction of the astragalus and scaphoid bones, about one inch in front of the ankle joint. The anterior or transverse arch lies under the anterior portion of the foot and is formed by the heads of the metatarsal bones.

When the foot is placed on the ground the bones forming the arches descend slightly under the weight, and when the foot is raised they resume their elevated position. The arches are, therefore, nature's "shock absorbers," and when weakened or broken down the individual loses that elasticity and spring to the step which makes walking an enjoyable and most healthful exercise.

The foot has two functions: (1) as a support for the weight of the body in standing, and (2) to raise and propel it in walking. To properly perform these functions, the muscles should be strong and active, and normal strength and activity are impossible unless the bones forming the arches occupy their normal position.

In the act of walking the weight of the body is largely supported by the muscles, but, when standing, the muscles are relaxed and the weight is thrown upon the ligaments. If the muscles are weak and unable to perform their function, the strain in walking falls upon the ligaments, which eventually give away, allowing the arches to fall. In this condition the muscles are compelled to work at a great disadvantage, and the effort to "carry on" causes pain and tenderness under the arches. This sometimes extends to the muscles of the calf, hip and lower back and is often mistaken and treated for rheu-

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matism, lumbago or sciatica. Corns and callosities are frequently present which greatly aggravates the condition and the general health and efficiency of the individual becomes greatly impaired.

Treatment.—The first essential in the treatment of all foot ailments, is a properly fitting shoe. Such a shoe should conform to the shape of the normal foot, with a moderately low heel and room enough for the toes. The next step is to strengthen the weak and stretched muscles by suitable exercises, in order that they may properly perform their functions. It must be borne in mind, however, that a weak muscle cannot be strengthened while working under the strain of a broken arch; therefore a support should be worn in the shoe to hold the displaced bones in their proper position until the muscles have recovered their lost power. This is absolutely essential once the ligaments have given away, because while muscle tissue has the power to contract, fibrous tissue of which the ligaments are composed has no such power.

Various forms of support have been devised to relieve the strain of flat feet, very few of which have any merit, while others do positive harm. This is because they are frequently made by individuals without medical education and therefore without a full and comprehensive knowledge of the anatomy and functions of the feet. Arch props made with inserts of leather or hard rubber under the sole are of very little value, because they fail to support the inner side of the foot, or key of the arch, and when the shoe breaks down from pressure of the pad they become utterly worthless. Metal plates, with or without a covering of leather, are heavy and cumbersome and, by splinting the feet, interfere with the action of the muscles and cause further weakness.

The author, after long experience as an orthopedic surgeon in civil and military practice, has devised a combination support which fulfils all the requirements for the successful treatment of weak or flat feet and effects a cure by encouraging functional use of the muscles.

Description.—The support consists of a flexible leather insole extending from the heel to the head of the metatarsal bones. On the under surface are two compartments or pockets (Fig. 2). (*a*) for the longitudinal arch and (*b*) for the anterior or transverse arch. These pockets, when filled with felt or other resilient material, conform to the shape of the arches, and by varying the amount of material introduced they may be raised and adjusted to meet the requirements of individual patients. A sufficient amount of padding and an instrument for adjusting it are provided for each case.

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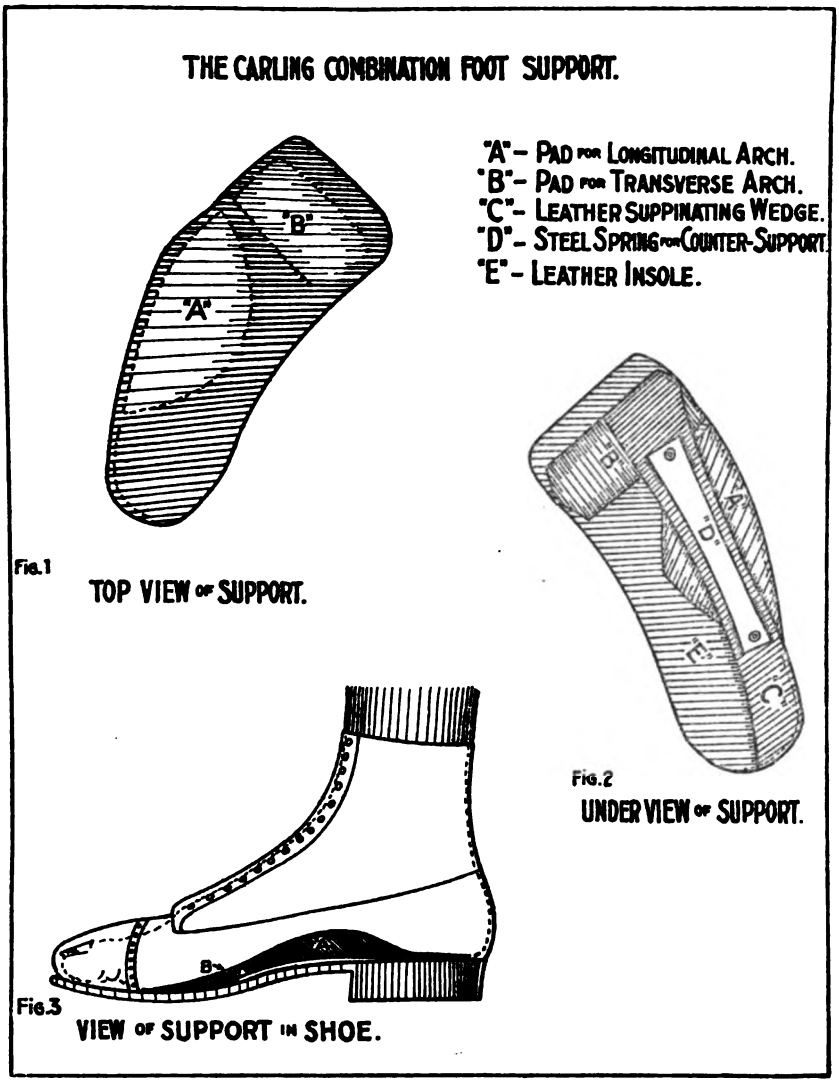
Metatarsalgia, or pain under the ball of the foot, is caused by a lowering of the bones forming the anterior arch (*b*). In such cases the padding in the anterior pocket is placed immediately behind the



metatarsal heads, and by raising one, or all of them if necessary, the pressure is removed and the pain and callus disappear.

In the condition known as flat foot, in addition to a lowering of the arches, the feet are usually pronated, throwing the weight upon

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the inner or weaker border. To overcome this tendency and balance the foot a supinating wedge of leather (*c*) ⅛ inch thick, is attached anteriorly and posteriorly to the under surface of the support, thus raising the inner border and obviating the necessity of inserting a wedge in the sole of the shoe.

On the under surface of the supinating wedge is attached a light steel spring, (*d*), which serves as a counter support to the longitudinal arch and, by strengthening the shank of the shoe, maintains the efficiency of the support at all times.

It will thus be seen that a support has been provided with, (*a*) a support for the longitudinal arch, (*b*) a support for the anterior or transverse arch, (*c*) a supinating wedge to overcome pronation, and (*d*) a counter support for the longitudinal arch. It is, moreover, light, flexible, adjustable, comfortable to wear, simple and efficient.

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EDITORIAL

THE GERMAN MEDICAL HISTORY OF THE WAR

"Fas est ab hoste doceri"

A prospectus of the official German Medical History of the war has recently been issued by the publishers (J. A. Barth, Leipzig), being a pamphlet of twenty-six pages, the major part of which consists of the Introduction to the series by Lieut. Gen. Otto von Schjerning, Chief Surgeon of the Medical Corps of the German Army in the Field. The work is to consist of nine volumes, the first of which is to appear in the fall of 1920. The first two volumes will deal with military surgery (1500 pp.) and the other seven, in succession, with internal medicine (900 pp.), neurology and psychiatry (500 pp.), ophthalmology (600 pp.), oto-rhino-laryngology (300 pp.), hygiene (500 pp.), pathology (600 pp.) and Roentgenology (450 pp.). The work will, therefore, be a strictly Medical History of the War, since there is no evidence that the administrative mechanism of such a vast enterprise as the medical service of an army of some 11,000,000 men will be dealt with. The material will be purely scientific. Remarkable is the apparent wealth of the prospective material in the subjects of neurology, ophthalmology, military hygiene, pathology and Roentgenology. But given the long, careful course of preparation made and four full years of an unparalleled experience with military medicine in the field, this should not be surprising. It is surprising, however, that no provision has been made for the detailed exposition of such subjects as the physiological aspects of aviation, the pathology and treatment of gas poisoning and the physical reconstruction, reëducation and rehabilitation of the crippled, the blind, and of those rendered helpless by the effects of the wounds, since these subjects had attained a high degree of development among the enemy, even before the war. The arrangement of subjects in the different volumes, subjoined at the end, is admirable, carefully thought out, and remarkable for the number of eminent names which figure among the prospective authors. The merits of this arrangement of subjects turn naturally upon the accumulated experience of four years running and the large amount of material collected in that time. The introductory chapter by Gen. von Schjerning, which is subjoined, gives a clear account of the work done by the Medical Corps of the German Army in the field and is followed by some five pages of valuable statistics, which are also subjoined herewith. It appears from von Schjerning's narrative that in May, 1918, there were 6,740 physicians of various grades and descriptions on active duty in the Zone of the Interior and

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11,585 in the field, or a total of 18,325. During the whole period of the war, there were more than 24,000 physicians on military duty, of whom two-thirds served in the field and one-third in the home territory. Three thousand served with the Red Cross. There were also 600 dentists and 1,800 apothecaries. Of these, 24,000 physicians, 1,325 or 54.2 per thousand of the total strength, lost their lives; of these 562 were killed in battle, and 763 died of disease; 2,149 physicians were wounded and 467 missing. As compared with our own large mobilization of medical officers, the comparatively small numbers of physicians employed in an army of 11,000,000 men may be explained by the fact that the German forces had relatively short lines of communication as compared with our own, which extended not only over the length and breadth of the United States but some 3,000 miles overseas. Furthermore, some fifty years of careful preparation counted for much, since it was possible, in this length of time, to block out specific duties for every medical man capable of rendering public or military service in a prospective war. As a matter of fact, it was an outstanding feature of the German medical organization, that for the most part, physicians engaged in scientific work at the great university clinics, in the many institutions of scientific medicine in which Germany abounds, and in other public or academic avocations, were not removed from their home towns but continued their ordinary duties, enjoying the advantage that the sick and wounded could easily be brought up to them from railhead at the front. Thus both the physicians and their soldier patients had the advantage of the fully equipped personnel of well organized university hospitals or clinics, a condition which was determined in advance by the relatively short lines of communication. As in France, the whole medical profession of Germany was liable to war duty. In our own medical mobilization, we had to make up the time lost through lack of preparedness by attempting to accomplish the work of years in unit time, by means of a greatly expanded medical personnel; and our preparations had to be made in view of the possible continuance of the existing war for many years. No comparison could therefore be fairly made between the two conditions. As compared with our own losses in the Medical Corps, 182, the German mortality was excessively high (1,325 for four years, 332 per annum).[1] The total losses of the German Army up to May, 1919 were 6,888,870, of which 1,686,061 were losses by death (1,531,048 killed in battle; 155,013 died of disease), while 4,211,469 were wounded and 991,340 were missing.

[1]This statement will not seem exaggerated when we consider that the maximum personnel of officers in the German Medical Corps was 24,000 plus for an army of eleven millions, while we had, on November 30, 1918, a personnel of 30,591 medical officers for an army of about four millions.

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Our own figures were 52,423 killed and died from wounds, 50,174 died of disease, out of a total loss of 318,993. The German losses were, therefore, over twenty times as heavy. Out of an army which averaged over 5,000,000 men in the four years of the war, no less than 19,461,264 men were reported sick, which shows the enormous difference between the actual totality of sick, between given periods, and the number of cases which have reported repeatedly to hospital. The figures of those returned from hospitals to the front as fit for duty are highly creditable, rising from 88.7 per cent in the first year of the war to 92.18 per cent in the fourth year. Nearly ten times as many men were killed in battle as died of disease. Von Schjerning notes that, in the list of casualties, gunshot wounds and fractures take the lead, while tonsillitis and diseases of the stomach and intestines take second place; infectious diseases presenting themselves at very moderate rates. The preponderance of gastro-intestinal diseases is very striking and was no doubt due to the defective food supply of the Central Powers. As everywhere, the epidemic of Spanish influenza caused the curve of infectious diseases to rise during the last year of the war. As might be anticipated, venereal infection was found to be relatively greater among troops in the home territory than among troops in the field. The increase was from 39,228 cases (15.2 per thousand total strength) in the first year of the war to 101,464 (20.2 per thousand total strength) in the last year. On the other hand, tuberculosis, which showed an enormous increase in the Zone of Interior (85 per cent in the larger cities), displayed a marked decrease in the field armies, due to the hardening of personnel through bodily exercise and life in the open air. By the fourth year of the war, the incidence of tuberculosis in the entire army had decreased from 7,166 (2.8 per 1,000 total strength) to 3,929 (.78 per 1,000 total strength). There is, therefore, no exaggeration in von Schjerning's statement that the open air life at the front created a huge power of resistance, indeed an almost hard and fast immunity against tuberculosis. Ample provisions for post mortems were made, resulting in the collection of over 7,000 preparations, with protocols and clinical histories. This attention to pathology was in striking contrast with English and American experience, which demonstrates the definite decline of gross pathology in these countries and the actual need for personnel with previous experience in making post mortem examinations. This phase of medical preparedness is also what might have been anticipated in a country where pathology has been so ardently followed and as part of the German program of preparation for the war.

Yet in spite of this long standing advantage in preparedness, and in view of the enormous sick list, the number of wounded in battle and the

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number who died from wounds and disease, it is doubtful if the German Army enjoyed the medical and hygienic advantages of the Allied Armies, and while the achievement on the scientific side is impressive, the settlement of questions of priority in regard to many discoveries claimed for German medicine by von Schjerning, will be difficult of adjustment. Something, no doubt, was learned from the experience of the allies. At the start, the German military authorities seemed to have been able to differentiate clearly between military and scientific secrets which should be carefully withheld, especially from the enemy, and information (of whatever kind) which may be disseminated with impunity. It is said that the medical periodicals, newspapers, etc., of the Allied Powers were freely and openly on sale in the larger German cities.

While von Schjerning's introduction, as subjoined, has a somewhat listless and colorless character, as if he were discouraged and disillusioned by the events subsequent to the war (under present conditions, he does not even use his military grade), its utterly impersonal character is to be otherwise highly commended. He indulges in no vituperation or criticism of the Medical Services of the Allied Powers and preserves throughout the consistent, impartial, impersonal attitude, which should characterize the true follower of medical science at all times and places. Very worthy indeed is the fine professional spirit everywhere apparent in his narrative, as of one who affirms himself to be, first of all, a physician; while his utterances as to the enormous teaching value of military experience in war time for our profession, whether in the acquisition of scientific knowledge or in the strengthening of character, will be confirmed by all fair-minded physicians whose privilege it has been to serve our own country as medical officers during the recent war.

F. H. Garrison.

THE ACTIVITIES AND ACHIEVEMENTS OF MEDICAL OFFICERS OF THE GERMAN ARMY DURING THE WAR: INTRODUCTION TO THE "HANDBOOK OF MEDICAL EXPERIENCES IN THE WORLD WAR"

By OTTO VON SCHJERNING[1]

Chief Surgeon in the Field

The great world war, which occupied the space of time between August 2, 1914, and November 11, 1918, is at an end. Given its unfavorable outcome for Germany, a fateful catastrophe was unavoidable; it resulted in a grave political and economic crisis for our country in which the mental, emotional and moral traits of part of our people revealed themselves, alas! in an evil light. It is easy to understand, therefore, now that a compulsory peace has closed its doors upon war, that, no one would

[1]Translated by Lieut. Col. F. H. Garrison, M. C.

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gladly lift the curtain again, and that any recollection of the war will be regarded as hateful. And yet it is our duty to show this war in the full light, since, in a manner, it has had for us its beneficent side and the word of Heraclitus, πόλεμος πάντων πατήρ (War is the father of all things) has its application to this unhappy war also. It has compelled us to see ourselves and to deal with ourselves as we really are; to smite our own breasts and to descend from the high cothurnus upon which we strode about the stage in such an unjustifiable manner; only thus can we again see ourselves and our own work in the true light. Through bitter want and misery, it has led us to scientific discoveries and inventions, which will be of overwhelming importance in our future national existence; it has widened and deepened the knowledge and the vision of the nations and has opened out to us new modes of transportation and unsuspected means of communication, in short, it has engendered advances in culture, which, for the future, will be of incalculable value. The tremendous and tragic occurrences, which the war has brought with it, are changing and ripening the national spirit and are giving it a new measure for the judgment of things. So we now find ourselves more receptive and more inclined to a critical matter-of-fact judgment of the phases of progress which the war has brought to us. To be sure, our judgment of things is not as yet certain in all respects nor is it stable; whether an attainment will be a permanent one or whether a given fact is to be finally numbered among the real treasures of our experience, remains to be seen. On every side, feelings of hate, envy and revenge are also in the ascendancy and no objective judgment can be formed as to what has been accomplished. But this will come in time.

Of the sciences, chemistry and medicine have undoubtedly done most for us; sustained, as they have been, by technical procedures, they have conquered far-reaching territories and occasioned investigations never before dreamed of. In its tremendous conquests and results, medicine was especially brilliant and to give an account of its contributions for the advantage and welfare of humanity to the healing of the sick, to the prevention of disease, and as a monumental memorial of the glorious self-sacrificing activities of the medical profession, is the purpose of this work. This war has added a laurel leaf to the history of medicine and on a plane with the heroic deeds of our army and of our soldiers, shine the achievements of our physicians, who deserve to be sung as once the Homeric heroes, Machaon and Podalirius, of whom one was famed for the ease with which his hand could cut out arrows from the flesh and heal every wound, while the other was able to recognize invisible ailments and to treat diseases believed to be incurable.

Certainly our physicians, too, were occasionally guilty of faulty treatment, errors in diagnosis and malpractice—to err is human—but everywhere an exalted sense of duty was recognizable and there was always evidence of humanity and warmth of heart in the treatment of patients. For more than four years, all told, most of the physicians fulfilled their duties day by day, in ample measure. In a hail of bullets they stood manfully to the assistance of the great press of the wounded, they cared for the sick with every device known to the art of medicine and continually they sought to hinder the occurrence of disease and the spread of epidemics. In wind and weather, in storm and night, they performed every duty, exposed themselves to the danger of infection, to all climatic hardships, to cold and snow in the east and the north, to the heat of the tropics, with its evil consequences in the desert regions of Macedonia, Turkey and Asia Minor. What self-sacrifice, what courage, what unselfish devotion have these years of medical activity to reveal! Only from this viewpoint can we comprehend why the losses among the medical officers were so uncommonly high; that death claimed 1,325 physicians, that is, 54.2 per 1,000

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of the total strength and that of these alone 562 or 23 per 1,000 fell in battle or died of wounds, and 763 or 31.2 per 1,000 succumbed to diseases; 2,149 physicians were wounded and 467 are missing. And almost every day brought forth new exacting tasks for medical officers.

Directly upon the outbreak of the war, the greater part of the medical profession was compelled to learn how to live in military surroundings entirely unfamiliar to most of them, to get used to an entirely new environment and to become acquainted with the modes of transportation, and shelter as well as the medicines and medical matériel peculiar to military conditions. And then began at once the great avalanche of the wounded and sick. Like a torrent was the forward advance into Belgium. There and in northern France and Alsace, fighting was continuous and simultaneously the transportation of the wounded back into the home zone began. The rule was that only those were kept behind who could not be transported or whose wounds could be healed in a very short time. All the rest went by the 238 hospital trains into Germany. The first period of the war included all fighting up to the battle of the Marne, then began the trench warfare in northern France, western Belgium and Flanders. This period is remarkable on account of the innumerable wounded, of whom the number of those injured by explosive shells is astounding; it is also notable for the beginning of attacks of tetanus in gunshot wounds, especially in northern France, and then by the appearance of typhoid fever and dysentery in the region of Metz and Champagne. It was rapidly verified in experience that certain localities, in particular manured fields, favored the development of tetanus, being a culture medium for its bacillus, and that the introduction of tetanus serum injection very soon availed to protect from the infection after the wounds had occurred. As rapidly as traumatic tetanus fell upon us, all the more rapidly were we able to prevent it and to obliterate the frightful pictures which characterized the tetanus cases in military hospitals. At my instance, Behring was early decorated with an iron cross for this work, as also Röntgen on his seventieth birthday, for his discovery, which has been of benefit to thousands and thousands of the sick and wounded.

In the meantime, the war went on in the east, on the Russian frontier, in Poland, and in Russia itself, and in this region brought typhoid, dysentery and then typhus fever, which until then was unknown to most of our physicians. And with the passing of the spring of 1915 and the advent of summer, came the cholera, which brought with it new problems for medical officers. Against typhus and cholera, all of us fought with every known hygienic means and we introduced a prophylactic inoculation of serum, so that our troops were vaccinated against smallpox with vaccine, and against typhus and cholera with typhus and cholera serum, a precaution to which I am inclined to ascribe the rapid decrease in typhoid in northwestern France and the light incidence of cholera and typhoid in the Russian war zone. Against dysentery in the East, vaccination with polyvalent sera was undertaken, as to the success of which opinion is still divided. In order to protect the Zone of the Interior from contagious disease, it was ruled and made compulsory that no convalescent from typhus or dysentery should be invalided home to Germany, and even where a furlough was found to be necessary after his convalescence, his return home was conditioned by most careful disinfection of all of his belongings. On the Eastern front, from Edytkuhnen to Rosenheim, 18 stations were established, in which "cleansing institutions" or so-called delousing stations were built for the disinfection of all uniforms, knap-sacks, etc., for the bathing of officers and enlisted men, so that before passing into German territory westward from the east, a complete personal cleansing of individuals and destruction of all pathogenic germs was

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carried out. These stations were so arranged that, taken by and large, 100,000 men with their effects daily could be cleansed and, at the same time, these men were bathed and their clothing was disinfected. In this way, the convection of disease from Russia to the home country, and to the Western front and westward, was prevented. On the Western front there were only a few cases of typhus fever, which were combatted as soon as observed, so that the disease was throttled at the source. In the West, convalescents from dysentery and typhus fever who were in need of further rest, were assembled at Spa, where they continued their recovery, until they were ready to rejoin their regiments.

In 1916, the trench warfare in Flanders and northern France was interrupted by the offensive against Verdun, where medical officers became well-acquainted with gas edema (gas phlegmon), which continued to menace the army, not only in the Somme offensive but in the Aisne and almost up to the end of the war. The disease derives its name from the accumulations of gas which are formed underneath the skin as products of inflammation and can be distinctly felt, indeed, were even found to be represented underneath the skin in Roentgen pictures of the wounded. Gas gangrene, a most deadly disease, compelled us to study its origin and to make extensive experiments toward its prevention; these resulted in a mode of treatment, which, unfortunately, only reached, in the last period of the war, the perfection that might result in complete cure.

The winter period in Flanders, with its damp trenches, and the cold of the Eastern front, brought on innumerable cases of frost bite and made the medical officers acquainted with frost gangrene in all its forms. In 1917, we have the same experience in wounds and diseases, both on the Eastern and Western frontiers. The only additional feature was the five-day fever of Volhynia, which appeared later in Flanders, whenever troops were changed from the East to the West. In the meanwhile, Bulgaria and Turkey began to participate in the war and the campaign against Roumania was begun. This campaign made us acquainted with the blood diseases dominating in Roumania, *e. g.*, scurvy, etc. The poor conditions of food supply and nutrition occasioned starvation edema and similar disorders of nutrition. Trench nephritis appeared in the East and perhaps even more in the West. The more the war was waged by us south of the Danube, the more malarial fever was in evidence, and physicians and medical officers became acquainted with its most varied forms. In the army itself, the variable results of quinine prophylaxis of malaria played a great part, especially in Constantinople, in Asia Minor and Macedonia. Dengue fever and Pappataci fever also became known.

America entered the war, and, in 1918, the Western offensive began. And as a new phenomenon, paratyphoid infection became severe in the West, particularly in Flanders; and Weil's disease (spirochaetal jaundice) in the Aisne region afforded an opportunity to become acquainted with its pathogenic parasite. At the close of the war, there began an epidemic of influenza, starting in Spain, which devastated all the armies and was accompanied by a disagreeable, often deadly, pneumonia. Even its course was longer than that of earlier epidemics, which usually began in the East and completed their course in the West. In addition, there was, in the larger cities, a full quota of venereal diseases which kept the medical officers especially busy. In Brussels, Warsaw and Bucharest, one incidence was particularly heavy, yet it is a fact not sufficiently well recognized that we succeeded in checking the general advance of venereal disease, in preventing its transmission into the home zone and in successfully treating most of the cases. In any case, the amount of venereal infection of the army within the home territory was relatively much larger than that

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among troops in the field. In the last months of the war, diseases of the skin, particularly tinea, were on the increase and, being hard to heal and rapidly transmitted under war conditions, they were a severe tax upon the medical corps. An increase in intestinal parasites was also noticeable in the latter part of the war.

Bombs from aëroplanes and air attacks generally were a feature of the whole war period, but their effects became more formidable in the West toward the end of the war. Many physicians were struck and killed by projectiles from aëroplanes, some of them even while engaged in hospital and immediately under the protection of the Red Cross. Worthy of mention above all, are explosions by mines, the effects of great projectiles, poisoning by carbon monoxide in the dugouts, burial under earth-slides, which always had very demoralizing effects, shell-shock and war neuroses. The attacks by poisonous gases were particularly destructive; this mode of warfare was entirely new and had to be brought to the comprehension of physicians by special courses on the treatment and healing of gassed soldiers and on the prevention of gassing by means of gas masks.

Such was the field of medical activity and the background against which the achievements of the Medical Corps were thrown into relief. Some of the medical officers were engaged as regimental surgeons with troops and accompanied the soldiers on the march into quarters, into trenches and dugouts; others were actively engaged in the field sanitary formations, the sanitary trains and field hospitals; while a third group were employed in the base and evacuation hospitals and on the lines of communication. Hospitals had to be built from the ground up almost everywhere and many medical officers, who had never before had these experiences, acquired such skill and readiness in the construction of hospitals and shelters that these structures soon fulfilled all hygienic and economic requirements, particularly in the matter of water supply and drainage. A special value was attached to the bathing and disinfecting plants and with the increasing plague of vermin, delousing plants became an urgent necessity. In many places, special hospitals were erected and supplied with all requisite appliances and instruments; so also the hospitals for venereal diseases, the ophthalmic hospitals, which were often supplied with specially constructed magnets for the removal of iron splinters from the eye, the hospitals for ear disease, and the hospitals for nervous disease; indeed whole districts were set apart for nervous patients, who could then be utilized for every kind of work, and placed under the direct control of nerve specialists. There were also special hospitals for diseases of kidneys and diseases of the intestines, since the procedure necessary for the successful treatment of these people was better carried out in special rather than in general hospitals. Even for special surgical cases, *e. g.*, for fractures of the femur and cases of gas phlegmon, special hospitals, under direction of specially trained physicians, were erected.

In this regard, the best support given us by our country was in respect of completely appointed hospitals and in the great number of highly trained specialists, with whom successful treatment was a matter of course.

There were on the average more than 24,000 physicians in the service of the Army, of whom two-thirds served in the field and one-third were occupied at home; 3,000 physicians devoted themselves to the service of the Red Cross. In addition to the medical officers, there were 600 dentists and 1800 apothecaries. Toward the end of the war, the number of physicians decreased, and the losses through death and disease became at times quite high and even medical students had to be called to the colors as physicians. In May, 1918, there were altogether 18,325 physicians on active duty, of whom 6,740 served on home territory and 11,785 with the field armies.

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All these men, particularly those in the field armies, have enlarged their knowledge and abilities and have widened their intellectual horizon through the war. Herein lies the blessing of war for physicians, in that they become stronger by training, richer through experience, and mightier in character, courage and ability. Special training in surgery, made itself memorable from the very nature of things. Strongly developed in resources, steadied in every way and acquainted with all the ills and necessities of war, the medical officers returned home from the war, bringing with them into civil life all these acquisitions in science, to the advantage of their fellow townsmen, whose confidence they have gained.

Under ordinary circumstances, a physician alone deals with the patient and his disease; in war time on the other hand, due to the close relation of personnel and the coöperative work in the military hospitals, there is an interchange of knowledge; nearly every case becomes a matter for consultation and the diagnosis and treatment are usually the result of a common interchange of thought. The causes of disease are also investigated and explored through coöperative investigation. And from these little councils, often held at the bedside, it was but a step to the larger and more frequent conferences and scientific addresses which took place in certain military districts and garrisons and from these to the great yearly assemblies of surgeons and internists and to the congresses of specialists, which were so successfully arranged for the advantage of science and proved so illuminative for all medical officers. In the great Central Headquarters of the West, we recorded meetings of medical officers, of advisory surgeons, of advisory internists and hygienists, for counsel on the prevention of typhoid, of dysentery, of preventive inoculation against typhoid, cholera and tetanus, of paratyphoid, in brief on all important questions bearing upon the protection of the health of the army and the prevention of the transmission of disease into the home territory. We held the first Congress of Surgeons at Brussels on April 7, 1915, the second meeting at Berlin on April 26-27, 1916, and the third again at Brussels on February 11-12, 1918; also a Congress of Internal Medicine at Warsaw on May 1-2, 1916;meetings of orthopedists and those interested in the care of the wounded at Cologne and Berlin, and a meeting of ophthalmologists at Heidelberg; a council on trench nephritis at the same university in October, 1916; sessions of the Scientific Senate at the Kaiser Wilhelms Akademie at Berlin, under my presidency, on July 26, 1917; meetings on the medico-military importance of nervous and psychic disorders due to the war, on malarial fever on January 30, 1917, and January 19, 1918; on gas edema on April 10, 1917, and December 22, 1917, on the proper lines for the medico-military consideration of nephritic patients on July 20, 1917, on preventive inoculation for dysentery on April 6, 1918, and many others. Among the subjects for consideration at the surgical congresses, the most prominent were: the indications for operative treatment at and behind the front, hemostasis, wound infection, gunshot injuries of the skull, of the chest, the abdomen, the arms and legs, as also the joints, the surgery of the vascular system; the ultimate effects of projectiles and their location in the body, gunshot wounds of the brain and nerves, the loss of the extremities, the sequels of gunshot wounds of the chest and abdomen, gunshot wounds of the larynx, the plastic surgery of the face and injuries of the jaws, protection from and prevention of gas edema, open wound treatment, antisepsis of the deep tissues by means of quinine derivatives, the manufacture of artificial limbs, positive and negative pressure in military surgery, gunshot wounds of the spinal cord, substitution products in military surgery, and also the transportation of the sick and wounded from the field. At Warsaw, we held council upon the protection of the army againt cholera, heart disease in soldiers, typhus fever and its epidemiology, typhoid and paratyphoid fever,

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preventive inoculation against typhoid, dysentery, and trench nephritis. An unusual stimulus to the study of all these subjects was afforded by the close discussion of the most important war diseases and war injuries and this was further helped out by the excellent courses for advanced medical studies which were to be found everywhere in the large and small cities of the home country; through these courses, knowledge of the most important character was disseminated for the general good of all and proved a great blessing in the interest of our sick and wounded. This was apparent in the results of medical treatment. When we consider that the shelters of the sick in war time were only temporary or improvised shelters and that treatment in the home town and its hospital was always preceded by the tedious transportation from the field to the home zone, which often is injurious to the patient, we can only describe the results of treatment as astonishingly good or even brilliant. With each year of the war, the reports of medical treatment became more and more favorable. In the zones of the interior, of the advance, and the lines of communication there were returned as fit for duty:

88.7 per one hundred in the first year of the war (Aug. 2, 1914–July 31, 1915)
91.3 per one hundred in the second year of the war (Aug. 1, 1915–July 31, 1916)
91.8 per one hundred in the third year of the war (Aug. 1, 1916–July 31, 1917)
92.8 per one hundred in the fourth year of the war (Aug. 1, 1917–July 31, 1918)

These figures are so impressive that our medical officers can be well satisfied with the results of their endeavors. And while in the war of 1870-71, the number of those who died of disease (especially as a result of infectious diseases) far surpassed the number of those who fell in battle; the reverse was the case in the present war. As against 1,531,048 killed in battle, we had 4,211,469 wounded and 155,013 died of disease in our armies. This affords a notable indication of the good hygienic conditions in the German armies and of the activities of the medical officers not only in treatment of disease but in the prevention of the occurrence and recurrence of disease. It is worthy of note that, from recent computations, the average strength of our army was:

2,577,126 men in the first year of the war (August 2, 1914–July 31, 1915)
4,435,853 men in the second year of the war (August 1, 1915–July 31, 1916)
4,989,739 men in the third year of the war (August 1, 1916–July 31, 1917)
5,028,161 men in the fourth year of the war (August 1, 1917–July 31, 1918)

and that of these armies

3,942,904 or 1530 per thousand of total strength were sick in the first year of the war.

4,915,663 or 1188.5 per thousand of total strength were sick in the second year of the war.

5,043,730 or 1010.8 per thousand of total strength were sick in the third year of the war.

5,558,967 or 1105.6 per thousand of total strength were sick in the fourth year of the war.

19,461,264 total sick in the four years 1914–18.

Given such a rich array of clinical material, which was continually subjected to excellent medical observation and treatment, it will not seem strange that scientific findings of value should result from it. To be sure, not all these questions and particularly those which have to be solved or demonstrated by means of statistical tables, have yet been settled. The wealth of the collected material is so great that it will require the work of years and the most comprehensive talent to exhaust its

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possibilities. Nevertheless, the scientific results of medical investigation of the war period can now be sketched out along broad lines.

The first fact to be established is that in all the four years of the war, among the different groups of disease and casualties, wounds from projectiles, in particular gunshot wounds and fractures (Group XII), make up the largest contingent; that inflammation of the tonsils and diseases of the stomach and intestines (Group V) come second; and that infectious diseases (Group I) present themselves at very moderate rates; only in the last year of the war do the figures in this group increase considerably, through the epidemic of influenza. Influenza alone caused in the four years of the war 708,306 cases of illness or 140.9 per 1,000 of the total strength. The venereal diseases amounted in the first year of the war to 39,228 cases or 15.2 per 1,000 total strength and rose in the last year to 101,464 or 20.2 per 1,000 total strength. Careful and scientific treatment of these diseases brought about recovery in nearly every case and prevented further spread of disease and infection, of which those at home, not properly esteeming the solicitude of our medical officers, were unduly fearful. Tuberculosis, which during the war, showed an enormous increase in the home population—the mortality from tuberculosis in our larger cities rose from 40,000 in the year 1913 to 74,000 in 1918 or 85 per cent—did not in the army attain to the slightest sign of any increase in mortality; on the contrary, a distinct decrease was noticeable. This experience indicates that our army demonstrated a huge power of resistance against tuberculosis and that the personnel had hardened itself in the most vigorous way, and through manifold bodily exertions and the continuous life in the open air, created for itself a hard and fast immunity from the disease. In the first year of the war, the cases of tuberculosis in the entire army amounted to 7,166 or 2.8 per 1,000 of the total strength, in the second year they came down to 6,865, in the third to 5,526 or 1.1 per 1,000 total strength and in the fourth year in continual decreasing progression to 3,929 or 0.78 per 1,000. In spite of the fact that the replacements of personnel were finally and from month to month almost unquestionably of poorer bodily vigor, many of those called to the colors had already been earlier treated in tuberculosis hospitals.

Of all our medical achievements, those in the field of ætiological findings seem to me the most brilliant and the most important. That we were able during the war to discover the cause of typhus fever and thus to investigate a disease which caused the greatest destruction not only in the army, but in the entire population of the Eastern front and which commonly spread with rapidity; that alone is a scientific achievement of the first rank. Let one merely reflect what a sacrifice typhus fever entailed upon the Napoleonic army in Russia in 1812, and one can realize how terribly our own army, which had never before suffered from typhus, would have been ravaged by this disease, if we had not succeeded in discovering its origin, in demonstrating its transmission by the louse and in establishing the fact that destruction of this vermin makes the spread of typhus fever impossible. To be sure, the true exciting cause has not yet been established with certainty, but the result of the knowledge of the relation of lice to the origin of typhus fever may be estimated from the fact alone that before this knowledge became known, hundreds of deaths took place from this disease in our prison camps, which had been invaded by typhus, but that after the vermin had been generally destroyed, the disease disappeared entirely.

Important, too, was the discovery of the five-day fever or Volhynian fever, which hitherto unknown, was first described as a pathological phenomenon through the investigation of German physicians. Another thing deserving of particular interest is the fact that the special cause of Weil's disease, that infection which begins with

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jaundice and typhoid manifestations and is associated with bathing in water, was discovered during the war and found to be a spirochaete. Trench nephritis was also investigated as to cause; also paratyphoid infection; and furthermore, important investigations on the origin of the different modes of malarial fever were made. Advances in the knowledge of the causes of the wound infection were made from the most varied angles and extensive investigations were undertaken of the cause of gas gangrene in particular. Hunger edema, hardly known in Germany before the war, was exhaustively studied and ætiological interpretations were afforded of trichinosis, influenza, tuberculosis and finally even of the different manifestations of disease resulting from the various gas attacks.

As in the case of ætiology, so also, was great progress made in the matter of ways and means of ascertaining an exact diagnosis. The surgeons, in particular, from the enormous amount of material on hand and its importance, gained new ideas for the investigation of gunshot wounds of the abdomen and applied Roentgen technique in new forms, especially in stereoscopic photographs for the location of foreign bodies. Microscopic and cultural investigations lead to new experiences in the bacteriological diagnosis of the dysenteries, to the so important early diagnosis of syphilis by a demonstration of the spirochaete, and to progressive advances in the interpretation of wound infection. Through the same means, the diagnosis of malarial and relapsing fevers was put upon a definite basis. The Weil-Felix reaction afforded a very useful diagnostic sign of typhus fever. On the other hand, as a result of preceding inoculation against typhoid, the agglutination test for typhoid lost its demonstrative power, which made the diagnosis of the disease more difficult.

Path-breaking in the field of prophylaxis were our experiences with preventive inoculation against infectious disease, in particular, typhoid, dystentery, cholera and paratyphoid. Attempts at inoculation for the attainment of immunity were even essayed against typhus fever and further experience was gained in regard to the manufacture of vaccines and particularly the choice of cultures. A gas-edema serum was made for the prevention of this disease and the obligatory application of preventive inoculation of tetanus-serum immediately after the wound, proved an endless blessing in the prevention of traumatic tetanus. One very important experience was the recognition and estabishment of the significance of "latent infection" in tetanus as well as in gas gangrene. In other words, since cases of light tetanus and gas gangrene were observed as a result of operations executed upon wounds, which had been healed for months, the conclusion was reached that tetanus and gas bacilli had been vegetating in a resting (spore) state in the former wounded tissues and their scars. Outbreaks of the disease were prevented by a prophylactic injection of serum, made before beginning the new surgical operation. As a means of disinfection, cyanic acid vapor took the place of blasts of steam, particularly in the destruction of vermin. Finally, equally novel experiences were made in the prevention of syphilis and gonorrhoea.

Among prophylactic measures, we may class, in a manner, the invention of steel helmets, which lessened the danger of gunshot wounds of the head, and the wearing of armor, which, however, for various reasons, was not carried into general use. Deserving of brief mention are also the many attempts at prevention of injuries of the tympanic membrane and of haemorrhage from the ear during the firing of guns of large caliber.

The advances made in therapeutics can only be sketched out in certain phases and along certain lines; an exact account of it would be out of place here, by reason of the very wealth of the material. What seem most outstanding are the results of

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treatment of neurotics of the war, which brought these tremblers back to manhood and made them capable of carrying on work and taking a worthy part in life. Of particular importance would appear to be the results of nerve suture, which gave to many unfortunates the possibility of regaining the use of limbs mangled and paralyzed by gunshot wounds. All in all, the therapeutic results of surgery, compel our undivided admiration, and we may specify in particular the varied methods of wound treatment and the different modes of disinfecting wounds, such as the Carrel chemo-therapeutic method, local treatment with quinine derivatives (vuzin, eucipin) and so on up to the old, yet ever new, open method of wound treatment. We wonder at the manifold splints and bandages of all kinds which exercised the skill of the surgical artists, at the new operative procedures, which made possible the re-uniting and healing of mangled limbs, with the best possible restoration of function (the Hackenbruch brace, the Reh brace, nail-extension), or which prevented anklyosis of important joints (Payr's method). We marvel at the technique of prothesis which furnished a substitute for portions of limbs which had been shot away (the methods of Sauerbruch and Krukenberg) and we are astonished at the results of plastic surgery, among which plastic results on the face, and the healing of gunshot wounds of the jaws make the deepest impression, for these are to be recorded as the greatest surgical advances made in the war. In the extraction of portions of projectiles from wounded eyes with the aid of strong and even the most powerful magnets, the science of ophthalmology assembled a wealth of experience and was able to save many eyes otherwise destined to be lost. Through early enucleation and exenteration of the eyeball in badly mangled eyes, sympathetic inflammation of the eye, so frequently observed hitherto, has been almost entirely done away with, so that in this war its terrors have disappeared. The most recent devices of bacterial therapy and serotherapy have been extensively applied in internal medicine, in typhoid fever, dysentery, cholera (antigen treatment), in typhus fever and Weil's disease (reconvalescent serum), and at the close of the war, the surgeons acquired a practical serum for gas edema, as to the success of which we are not certain. Among the chemo-therapeutic procedures which arose in the war period, are the early treatment of syphilis by salvarsan, the abortive treatment of gonorrhoeal infection by silver preparations, the development of the so called "provocative method" in latent malaria and the effect of cystin preparations on carriers of typhoid fever. Special attention was devoted to the digitalis preparations; and an acquisition of special prominence was the dietetic treatment of dysentery and typhoid fever, which, in opposition to the starvation treatment hitherto employed, hastened recovery and restoration to health by means of a liberal diet instituted at the beginning of the second week. The psychiatrists established the marked decrease in alcoholic insanity during the war period.

In the field of pathological anatomy, it was a happy and fruitful thought to establish post-mortem stations in all the armies; in these, under the direction of the pathologist attached to the Chief Surgeon, work was carried on from definite viewpoints. Scientific protocols of post-mortem sections were written out and collections of important pathological preparations, now in the Kaiser Wilhelms Akademie in Berlin and in Munich and Vienna, were established and brought together. In the collection of pathological specimens of the war in the Kaiser Wilhelms Akademie there are over 7,000 preparations, with the protocols of the sections and, in many cases, with copies of the corresponding clinical histories. What material could be more excellent for purposes of investigation and study than this collection of war pathology, which has been increased by microscopic slides made by the best author-

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ties? Through the wealth of the material obtained from the war and especially through its peculiar character, this collection has opened a wide field of activity for the pathologists, during the war as also for the years to follow. The forms of injury made by projectiles of the most varied kind are very different in character from the established forms of injury described in the literature of earlier wars. The preponderance of wounds from artillery projectiles is particularly apparent and even during the war itself, the difference was revealed, when the gunshot wounds, which were most frequent in the earlier stages of the war, were outnumbered by artillery wounds. Furthermore, new modes of warfare and novel injuries resulting from the introduction of technical improvements were observed. Bombs and hand grenades, explosions of mines, novel and most varied projectiles from infantry arms, the projectiles especially employed by the enemy, which in part are to be reckoned with the dum-dum bullets, all these occasioned peculiar modes of injury. To these must be added the injuries incurred in falling from aëroplanes, from burial in the earth and contusions of the severer types.

We must further consider the most recent kinds of destructive gases, the variable composition of which occasioned pathological manifestations of the most varied kind. In the department of internal disease and epidemic diseases, the pathologist again acquired an extensive, sometimes unusual, sometimes even unknown material for study. Trench nephritis, influenza, paratyphoid infection, Weil's disease, five-day fever, relapsing fever, scurvy, smallpox, typhus fever, malarial fever, hydrophobia, cholera, pellagra, leprosy, intestinal worm infection and many other diseases, brought to the pathologist a quantity and variety of material for investigation, such as has never before been the case.

The material of this war has been no less to the advantage of constitutional pathology. Never before has it been possible to make an anatomic investigation of such a large number of persons, who had suddenly died from wounds at the ripest period of manhood and in the best condition of health. Through this fact, it was possible to make comparative investigations in the greatest number. Through the special possibility of making an early post-mortem section, directly after death, in cases of severest injuries, *e. g.*, in destruction of the cranium and heart by gunshot wounds, it was possible to make most valuable observations of the normal conditions of the organs in human bodies still warm with life. The form of the systolic and diastolic heart, the form of the stomach in its different states of contraction and fullness, corresponding with the Roentgen appearances in the living, the appearance of the gastric mucous membrane in relief, the states of intestinal contraction, the relations of the rectum to the prostate and the seminal vesicles, have all been thoroughly studied.

Studies in ethnic anatomy have been made with reference to the very composite racial complexion of the armies of the enemy. Skeletal material and death masks of foreign peoples, in particular the Asiatic and African races, as also the Balkan populations, have been collected. Eunuchs and Roumanian castrates have been investigated and in some cases brought to post mortem.

Comparative measures of the length of the intestines have been made. Furthermore, an opportunity was also afforded to utilize the gigantic material in the question of the phthisical habit of body as also the general tuberculosis question, its frequency, localization and metastases. The dispute as to the justification of establishing a norm of the lymphatic constitution, the question of the status thymo-lymphaticus, have been considered, also abnormities and tumors, the question of the narrow aorta, syphilis, and the relation of the glands of internal secretion to one another. In aid

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of medico-legal consideration of the psychic constitution, tattoo markings have been assembled in great numbers. Attention has also been directed, incidentally, to other problems, in particular wound infection and above all, gas edema and tetanus. The effect of vaccination upon the entire organism and the individual organs has been considered in detail. Special attention has been directed to all questions which relate to the cause of sudden death, to questions of injuries incurred in line of duty, uncertain diagnoses, remote effects and late sequelae of wounds and injuries.

Thus an endless array of pathological material has been assembled and investigated by our medical officers and the results of this accumulation of knowledge are now revealed in all branches and professions of the theory and practice of medicine. If Helmholtz could today examine and illuminate the progress of medicine, as he once did in his famous address on "Thought in Medicine" on foundation day at the Friedrich Wilhelms Institut in 1877, he would undoubtedly establish the fact that the once almost matronly countenance of Dame Medicine has in the last decades, and especially through and after the war period, taken on a more lively and youthful semblance and that her pulse beats with a stronger and more lifelike rhythm than in 1877.

It is our object to set forth in this work, every new achievement which has been made by our physicians in the science and art of medicine during the war period. May it be our good fortune to describe what has been accomplished in a great and worthy manner! Only then will this work be a lasting memorial to our medical officers; it will establish their glory, the success of their endeavors and their power of achievement, it will be of service for the emulation of coming generations and will advance and guard the interests of our science. So, therefore, may the thanks be rendered which I, as Chief of the Field Service of the Medical Corps in the war, at home and in the war zone, feel it to be my duty to pay to our medical officers for their willing and self-sacrificing labors and for their true loyalty to the Corps. May the future protect and be of advantage to medicine; may better political and economic times again follow for the disciplies of Æsculapius than now exist; may the memory of the medical officers who have so gloriously fought and died in the war be held in lasting honor and may our country, which now finds itself in such a distressed condition, never forget what German physicians have faithfully and self-sacrificingly done for it in the darkest days of the war.

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APPENDICES

TABLE 1.—*Losses of the German Medical Corps*

(From the lists of losses continued by the Medical Department up to January 10, 1919. In absolute numbers and in relation to total strength)

	Medical officers.								Field auxiliary and assistant surgeons		Civilian physicians, including those liable for duty in the Landsturm		Total	
	Active		Retired officers on active duty		Reserve officers recalled to duty		Reserve officers including approved acting assistant surgeons							
		Per 1000		*Per* 1000		*Per* 1000		*Per* 1000		*Per* 1000		*Per* 1000		*Per* 1000
Killed or died of wounds.	53	34	.....	.....	6	4	309	35	147	32.6	47	6	562	23
Died of disease or other causes	64	41.1	28	86.9	87	57.5	326	37	107	23.7	151	19.5	763	31.2
Total.....	117	75.1	28	86.9	93	61.5	635	72.1	254	56.3	198	25.5	1325	54.2

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TABLE 2.

In May, 1918, there were on duty:

(*a*) *In the Zone of the Interior:*

42	Surgeons General.
103	Deputy Surgeons General (Division Surgeons).
698	Surgeons Major.
1,825	Regimental surgeons.
1,225	Battalion surgeons.
16	Approved assistant surgeons.
1,594	Acting battalion surgeons (from civil life).
289	Acting assistant surgeons (from civil life).
333	Auxiliary field surgeons.
615	Assistant field surgeons.
Total...6,740	Medical officers.

(*b*) *In the Armies in the Field:*

11,585	Medical officers.
Total..18,325	Medical officers.

TABLE 4.—*Losses of the German Army from the Lists of German Losses Published up to the End of May, 1919*

	Officers	Officials	Acting as officers	First sergeants	Sergeants	Petty officers	Privates	Total
1. Killed.....	45,123	762	7,402	31,734	15,261	122,812	1,307,954	1,531,048
2. Missing.....	17,215	66	2,794	19,106	19,311	69,510	863,838	991,340
3. Wounded....	91,679	499	16,870	89,192	49,090	330,013	3,641,126	4,211,469
4. Died of disease, etc...	3,903	543	477	2,785	2,233	7,778	137,294	155,013
Total.....	157,920	1,870	27,543	135,817	85,895	530,113	5,949,712	6,888,870
Total mortality.....	49,026	1,305	7,879	34,519	17,494	130,590	1,445,248	1,686,061

1. "Officers" include sanitary and veterinary officers.
2. "Officials"=chiefs and subaltern officials.
3. "First sergeants" include surgeons and veterinarians' assistants.

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TABLE 3.—*Losses to the Service of Officers and Men of the German Field Army, Treated in the Hospitals of the Zone of the Interior, at the Front and on the Line of Communication (Computed per 100 of the Permanent Withdrawal).*

In the	Home territory			Front and line of communication			Zone of interior, advance and line of communication			Army of occupation hospital patients		
	Dutiable	Died	Otherwise with drawn	Dutiable	Died	Otherwise with drawn	Dutiable	Died	Otherwise with drawn	Dutiable	Died	Otherwise with drawn
First year of the war, to Aug. 31, 1915	89.4	1.7	8.9	86.7	10.2	3.0	88.7	4.0	7.3	92.2	1.2	6.6
Second year of the war, to Aug. 31, 1916	91.1	1.0	7.9	91.9	6.2	1.9	91.3	2.8	5.9	89.1	1.1	9.7
Third year of the war, to Aug. 31, 1917	90.1	1.1	8.8	94.1	4.6	1.3	91.3	2.6	5.0	87.3	1.5	10.7
Fourth year of the war, to Aug. 31, 1918	90.0	1.2	7.8	94.7	4.4	0.9	92.3	2.3	4.4	88.6	2.0	9.4

1. Dutiable = Fit for combatant service, for garrison duty or as laborers.

2. Otherwise withdrawn = Furloughed, deserted, and unfit for service with or without pension. Many of the furloughed and of those sent to health resorts, became later on again fit for service, so that the figures of those fit for service are a little higher than given above.

3. Although not all the hospital reports of the Field Army, upon which these computations are based, are as yet available, yet the mass of these reports which has already been prepared and submitted is so nearly complete that no essential changes in the percentages here given need be apprehended.

4. Permanent withdrawal = Hospital patients permanently withdrawn from treatment, *i. e.*, exclusive of patients transferred to other hospitals.

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TABLE 5.—*Records of Patients Admitted to Hospital from the German Army According to the Sick and Wounded Reports.*

Admissions per year of war (per 1000 = in terms of average actual strength per year)	Average actual strength during period of report (including officers, sanitary and veterinary officers and officials)	Group I														Group II
		Smallpox	Scarlatina	Measles	Diphtheria	Typhoid fever	Typhus fever	Intermittent fever	Influenza	Tuberculosis	Dysentery	Asiatic cholera	Rheumatic fever	Heat stroke	Other infections and general diseases	Diseases of nervous system
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
First year	2,577,126	18	469	180	603	14042	81	417	86320	7166	6971	944	65514	2794	24738	60813
Per 1000		0.01	0.01	0.07	0.23	5.4	0.03	0.16	33.5	2.8	3.7	0.37	25.4	1.1	9.6	23.6
Second year	4,135,853	39	615	291	2388	5423	442	4480	212156	6865	7983	914	75123	809	31435	88697
Per 1000		0.01	0.15	0.07	0.58	1.3	0.11	1.1	51.3	1.7	1.9	0.22	18.2	0.2	7.6	21.4
Third year	4,989,739	42	518	311	2887	2555	963	23831	226398	5526	11945	117	49790	660	32156	85912
Per 1000		0.01	0.1	0.06	0.58	0.51	0.19	4.8	45.4	1.1	2.4	0.02	10.0	0.13	6.4	17.2
Fourth year	5,028,161	74	404	208	3646	3536	1415	49942	708306	3929	20796	65	40374	451	35653	77915
Per 1000		0.01	0.08	0.04	0.73	0.7	0.28	9.9	140.9	0.78	4.1	0.01	8.0	0.09	7.1	15.9

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TABLE 5.—*Continued.*

Admissions per year of war (per 1000 = in terms of average actual strength per year)	Average actual strength during period of report (including officers, sanitary and veterinary officers and officials)	Group III			Group IV		Group V							Group VI	Group VII	Group VIII		Group X
		Pneumonia	Pleurisy and sequelæ	Other respiratory affections	Diseases of heart	Diseases of blood-vessels and hemato-topoetic system	Tonsillitis	Diseases of mouth, pharynx, œsophagus and salivary glands	Diseases of stomach and intestines	Abdominal hernia	Other diseases of digestive system	Diseases of genito-urinary system (exclusive of venereal)	Venereal diseases	Infections of eye	Other eye diseases	Ear diseases
		16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
First year.....	2,577,126	17124	19318	330770	82945	236877	599	1147	6899	2034	34695	45715	39228	1653	6566	64665
Per 1000.....		6.6	7.5	128.3	32.1	9.2	30.1	44.5	228.9	13.3	13.5	17.7	15.2	0.64	25.3	25.1
Second year....	4,135,853	16471	24782	426630	100398	39371	8907	1748	7167	1839	52437	95259	65425	1472	9817	98709
Per 1000.....		4.0	6.0	103.2	24.4	9.5	23.9	42.3	162.4	12.7	14.8	23.0	15.8	0.36	23.7	23.9
Third year.....	4,989,739	18018	24658	447642	74286	40294	2682	1797	5477	5044	39529	56145	106306	77196	1275	9574	93156
Per 1000.....		3.6	4.9	89.7	15.0	8.1	18.6	36.0	155.3	7.9	11.3	21.3	15.50	0.26	19.2	18.7
Fourth year....	5,028,161	15761	31284	366783	58929	40739	8694	1403	8071	9063	31697	41780	108947	101464	804	8481	80923
Per 1000.....		3.1	4.2	72.7	11.7	8.1	17.6	27.9	155.5	6.3	8.3	21.7	20.20	0.18	16.9	16.1

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TABLE 5.—*Continued.*

Admission per year of war (per 1000 = in terms of average actual strength per year)	Average actual strength during period of report (including officers, sanitary and veterinary officers and officials)	Group X		Group XI	Group XII					Group XIII	Group XIV	Total		There are included under No.				
		Diseases of skin, etc.	Panaris	Diseases of bones and joints	Diseases of muscles	Gunshot wounds	Wounds from *Arrest blanches*	Fractures, sprains and dislocations	Other wounds and injuries	Other diseases	Under observation		Tetanus	Weil's disease	Insanity	Nephritis	Gassing
		31	32	33	34	35	36	37	38	39	40	41	14	14	15	26	39
First year.....	2,577,126	363194	38021	85491	21006	950214	20346	126112	149201	144723	41616	5942904	.....	.....	.....	.....	.....
Per 1000.....		140.9	14.8	33.2	81.5	368.7	7.9	48.9	57.9	56.2	16.1	1530.0					
Second year....	4,135,853	615194	51141	100134	28974	761790	6049	152518	226645	169995	78162	4915663	4	7	9	1292	6178
Per 1000.....		148.7	12.4	24.2	70.1	184.2	1.5	36.9	54.8	41.1	18.9	1188.5	....	....	....	0.31	1.5
Third year.....	4,980,739	699356	46991	90420	26217	726073	3607	149338	258027	160975	80893	5043730	10	108	30	3058	19164
Per 1000.....		140.2	9.4	18.1	52.5	145.5	0.72	29.9	51.7	32.3	16.2	1010.8	..	0.02	.01	0.61	3.8
Fourth year.....	5,028,161	748250	43691	78102	23645	594633	2811	138114	242145	176492	87528	5568967	3	55	8	2600	53321
Per 1000.....		148.8	8.7	15.5	47.0	177.9	0.56	27.5	48.2	35.1	17.4	1105.6	..	0.01	....	0.52	10.6

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TABLE 6.—*Records of Admission to Hospital of the German Army Arranged by Groups of Diseases and Injuries (I-XIV).*

Admissions per year of war	Group I	Group II	Group III	Group IV	Group V	Group VI	Group VII	Group VIII	Group IX	Group X	Group XI	Group XII	Group XIII	Group XIV	Total
	Contagious and general diseases	Diseases of nervous system	Diseases of respiratory organs	Diseases of circulatory organs and blood	Diseases of digestive organs	Diseases of genito-urinary organs	Venereal diseases	Diseases of eye	Diseases of ear	Diseases of skin, etc.	Diseases of locomotive organs	Wounds and injuries	Other diseases	Under observation	
First year	210257	60015	367212	106503	851306	45715	39228	68219	64665	401215	295559	1245878	144723	41616	3942904
Per 1000	81.6	23.6	142.5	41.3	330.3	17.7	15.2	26.5	25.1	155.7	114.7	483.4	56.2	16.1	1530.0
Second year	249963	38697	467885	140269	1059410	95259	65425	99644	98799	666335	389880	1146942	169995	78162	4915563
Per 1000	84.4	21.4	113.1	33.9	256.2	23.0	15.8	24.1	23.9	161.1	94.3	277.3	41.1	18.9	1188.5
Third year	357699	85912	498318	115120	1143154	106306	77196	97018	93156	746347	852591	1137045	160975	80693	5648730
Per 1000	71.7	17.2	98.3	23.1	229.1	21.3	15.5	19.4	18.7	149.6	70.7	227.9	32.3	16.2	1010.8
Fourth year	868799	779151	402888	99668	1084514	108967	101464	85723	80923	791841	814617	1277708	176492	87528	5558967
Per 1000	172.8	15.5	80.1	19.8	215.7	21.7	20.2	17.0	16.1	157.5	62.6	254.1	35.1	17.4	1105.6

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TABLE 7.—*Amounts of Sera and Vaccines Used for Preventive Inoculation.*

Tetanus serum	10,050,000	preventive inoculations.
	85,389	curative injections.
Diphtheria serum	200,000	flasks.
Smallpox lymph	12,615,000	doses.
Meningitis serum	395	liters.
Dysentery serum	7,130	liters.
Dysentery vaccine	1,345	liters.
Typhoid vaccine	103,360	liters.
Paratyphoid vaccine	940	liters.
Cholera vaccine	79,821	liters.
Cholera serum	122	liters.
Gas edema serum	5,655	liters.
Normal horse serum	48	liters.
Pneumococcus serum	24	liters.
Staphylococcus serum	30	liters.
Streptococcus serum	210	liters.
Gonococcus serum	49	liters.
Plague vaccine	32	liters.
Plague serum	98	liters.

PLAN OF THE GERMAN MEDICAL HISTORY OF THE WAR

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I. (a) Offensive Measures in the World War and their Effects upon the Body and its Tissues. Firearms, Ordinary Projectiles (Dr. Fritz Brüning).

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(*a*) From the Balkan Theater of War (Prof. L. Brauer).
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XVI. On Optical Aids in Cases of Gunshot Wound (Prof. W. Stock).
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II. Injuries of the Antrum (Prof. R. Hoffmann).
III. Gunshot Injuries of the Frontal Sinus, the Ethmoid Cells and the Sphenoidal Sinus (Dr. Max Weingaertner).
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V. Gunshot Injuries of the Larynx (Prof. Gustav Killian).
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B. Diseases and Injuries of the Ear

I. Injuries of the Organ of Hearing: (*a*) of the External Ear, (*b*) of the Middle Ear, (*c*) of the Internal Ear (Prof. O. Fleischmann); (*d*) Diseases of the Central Paths of Audition and Equilibrium (Prof. O. Voss).
II. Damage Done to the Organ of Hearing through Explosions and Effects of Sound Waves (Prof. B. Oertel).
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IV. Functional Injuries of the Organ of Hearing through the Effects of War (Prof. K. von Eicken).
V. Aggravation and Simulation of Disorders of Hearing in Soldiers in Campaign (Prof. P. Stenger).

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VI. Reciprocal Relations of Old-Standing Ear Troubles and Gunshot Injuries of the Ear (Prof. H. Rhese).
VII. Preventive Measures against Impairment of Hearing in Soldiers: Curative Measures; Plastic Operations and Prothesis in Injuries of the Muscles of the Ear; Prothesis in Impairment of Hearing (Prof. P. Friedrich).

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XII. Influenza (Prof. B. Möllers).
XIII. Venereal Diseases (Prof. W. von Drigalski).
XIV. The Parasitic Diseases of the Skin (Prof. G. Arndt).

C. Appendix

Prevention of Gassing (Dr. W. Niehues).

VOL. 8.—PATHOLOGICAL ANATOMY (Editor: Prof. Ludwig Aschoff), 600 pp.

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- (*d*) Typhus Fever (Prof. E. Fraenkel and Dr. W. Ceeler).
- (*e*) Epidemic Cerebro-spinal Meningitis (Dr. G. Gruber).
- (*f*) Poliomyelitis (Prof. O. Meyer).
- (*g*) Influenza (Dr. Fahrig).
- (*h*) Weil's Disease (Prof. H. Beitzke).
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- (*k*) Relapsing Fever (Prof. Fr. Luksch).
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- (*a*) Direct Pathological Effects of Gunshot, Bayonet, Saber Wounds, etc.
  1. General Considerations on the Effects of Projectiles, Weapons, etc. Anatomy of Shock, Hemorrhage and Death from Hemorrhage. Fatty Embolism. Varied Powers of Resistance of the Tissues according to Physical Structure (Prof. M. Borst).
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  4. Gunshot Injuries of the Peripheral Nervous System (Prof. W. Berblinger).
  5. Gunshot and Other Injuries of the Blood Vessels (Prof. M. B. Schmidt).
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     (*b*) Meningitis (Prof. A. Ghon).
  7. Gunshot Injuries of the Spinal Canal and Its Contents:
     (*a*) Recent Stages (Prof. G. Ricker).
     (*b*) Older Stages (Prof. C. Benda).
  8. Gunshot Injuries, etc., of the Organs of the Neck (Prof. S. Oberndorfer).
  9. Gunshot Injuries of the Thoracic Organs (Prof. H. Merkel).
  10. Gunshot Injuries, etc., of the Abdominal and Pelvic Cavities (Prof. A. Dietrich).
- (*b*) Direct Pathological Effects of War from Grosser Physical Agencies: 1. From Precipitation from Aëroplanes. 2. From Earth-Slides. 3. From Atmospheric Pressure (Dr. H. Groll).
- (*c*) Direct Pathological Effects of Heat and Cold in War: 1. Burns. 2. Heatstroke. 3. Exposure to Cold. 4. Freezing of the Body (Prof. Ludwig Pick).
- (*d*) Direct Pathological Effects of Chemical Agencies in War. 1. Gas Poisoning (Dr. W. Koch). 2. Asphyxias of Peculiar Type (Prof. J. Miller).

IV. The Healing of War Injuries, Particularly of Wounds. Disturbances and Complications of Wound-healing.

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(*a*) Delayed Healing by Wound Infection:
1. Tetanus. 2. Gas Edema. 3. Pus Infections (Prof. L. Aschoff).
(*b*) Complications by Secondary Infection of Other Organs:
1. Urinogenous Infection. 2. Bronchogenic Infection (Deglutition Pneumonia). 3. Enterogenous Infection (Thrush, etc.) (Prof. L. Aschoff).
(*c*) Other Complications, Particularly through Disorders of the Circulation:
1. Thrombosis. 2. Bedsores. 3. Gangrene. 4. Erosions of the Gastric Mucous Membrane (Prof. Robert Rossele).

VOL. 9.—RONTGENOLOGY (Editor: Prof. Rud Grashey), 450 pp.

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APPENDIX: STEREOSCOPY (Prof. A. Hasselwander)

(*C*) *Medical Portion*

I. Surgical Röntgen Diagnosis:
1. Diagnosis of Recent Injuries (Prof. Rud Grashey).
Appendix: (*a*) Dumdum Wounds (Prof. W. Niehues).
(*b*) Gasphlegmon (Prof. A. Burchard).
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(*b*) Injuries of the Skull (Prof. N. Guleke).
(*c*) Injuries of the Jaws (Dr. F. Hauptmeyer).
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(*e*) Injuries of the Abdominal Organs (Dr. J. Groedal).
(*f*) Injuries of the Urinary Organs (Prof. L. Kielleuthner).
3. Diagnosis of Other Surgical Conditions in Soldiers (Prof. R. Grashey).

II. Röntgen Diagnosis in Internal Medicine:
1. Diagnosis of Diseases of the Heart and Blood Vessels in Soldiers (Dr. H. Zondek).
2. Diagnosis of Diseases of the Lungs in Soldiers (Dr. K. Kaestle).
3. Diagnosis of Diseases of the Digestive Organs in Soldiers:
(*a*) Observations in the Field (Dr. W. Alwens).
(*b*) Observations in the Home Territory (Dr. F. Groedel).

III. Röntgen Procedures in Neurology (Prof. H. Albers-Schonberg and Prof. A. Saenger).

IV. Röntgen Procedures in Oto-Rhino-Laryngology (Dr. A. Blau).

V. Röntgen-Therapy (Prof. K. Altmann).

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ASSOCIATION NOTES

The following is the program of the meeting at New Orleans as arranged at present. It is possible that some minor changes may be made in it, but it is not believed that these will be many, and there may be none. It will be admitted that the program as printed promises much of interest to the members of The Association. We have promises of attendance of delegates from the following foreign countries: Belgium, Cuba, Canda, England and the Netherlands.

It is earnestly urged that members of The Association attending this meeting help make it as successful as the program deserves that it should be:

TENTATIVE PROGRAM, MEETING OF THE ASSOCIATION OF MILITARY SURGEONS OF THE UNITED STATES, NEW ORLEANS, LA., APRIL 22–24, 1920.

HEADQUARTERS, HOTEL GRUNEWALD

First Session, April 22, 9.00 a. m.

1. Address of the President.

Reports of Executive Council, Secretary-Treasurer, Committee on Arrangements, Literary Committee, Committee on Legislation, Boards of Award, Necrology Committe.

Appointment of Nominating Committee, Auditing Committee, Committee on Resolutions.

Consideration of Amendments to Constitution and By-laws.

Miscellaneous business.

2. Addresses:

"Emergency Measures in Malaria Control," Surgeon L. B. Frick, U. S. P. H. S.

(Subject to be announced later), Lieut. Col. Robert A. Strong, M. C., U. S. A.

Second Session, 2.00 p. m.

1. Addresses:

"The Training of the Enlisted Men of the Medical Department," Dr. Gustavus M. Blech.

"Some of the Lessons of the War Which Are Applicable to Civil Practice," Dr. John Smyth.

"Deficiency Disease, with Special Reference to Pellagra," Surgeon Jos. Goldberger, U. S. P., H. S.

Third Session, 8.00 p. m.

1. Motion Pictures (20 minutes), illustrating:

"Technique Used at the Pennsylvania Hospital in the Treatment of Infections and Infected Wounds with Dichloramine-T."

"The Carrel Technique in the Treatment of Infections of the Bones and Joints."

2. Addresses:

"Venereal Disease in the Dutch Army," Dr. J. P. Bijl, Dutch Army.

(Subject to be announced later), Dr. C. E. Verdier.

"Physiotheraphy at the U. S. Naval Hospital, New York, N. Y." Captains C. H.

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T. Lowndes, F. E. McCullough, A. M. Fauntleroy, M. C., U. S. N., and Comdr. Wm. Seaman Bainbridge, M. C., U. S. N. R. F.

Fourth Session, Friday, April 23, 9.00 *a. m.*

1. Addresses:

"The Founding of This Association, and Its Founder, as I Knew Him.—An Anecdotal Sketch of Professor, Doctor Nicholas Senn," Dr. Horace M. Brown.

The Practical Aspect of Trachoma and Its Control. Surgeon John McMullen, U. S. P. H. S.

"Why a Sanitary Train?" A. A. Surg. Wilbur S. Conkling, U. S. P. H. S.

Fifth Session, 2.00 *p. m.*

1. Addresses:

"The Results of Wound Excision and Suture," Lieut. Col. Martin B. Tinker, M. R. C., U. S. A.

"Neurologic Service in Naval Hospitals," Lieut. Comdr. R. F. Sheehan, M. C., U. S. N.

"The Future of Psychiatry in the Army," Med. Dir. Thomas W. Salmon, Nat. Comm. for Mental Hygiene.

Sixth Session, 8.00 *p. m.*

1. Motion Pictures (20 minutes), illustrating:

"Appliances Used in Bone and Joint Injuries."

2. Addresses:

"Impressions Gathered from the Experiences in the Great War from the Surgery of the Vascular System," Maj. Rudolph Matas, M. C., U. S. A.

"Types of Motor Ambulances Observed Abroad," Capt. F. L. Pleadwell, M. C., U. S. N.

Seventh Session, 9.00 *a. m., Saturday, April* 24.

1. Report of Nominating Committee.
2. Election of Officers.
3. Addresses:

"Modern Military Medical and Surgical Reconstruction in Relation to Vocational Education of Discharged Compensable Disabled Soldiers," Col. Frank Billings, M. C., U. S. A.

(Subject to be announced later), Col. Wm. F. Snow, M. C., U. S. A.

4. Installation of Officers and Reports of Committees.

Unfinished business.

Adjournment.

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COMMENT AND CRITICISM

THE TONSIL IN RELATION TO ARMY EFFICIENCY [1]

By Major HENRY HALL FORBES

Medical Reserve Corps, United States Army

To those who have come from civil life the question of man power or greatest efficiency is in a way a new problem which we must face and a new attitude which we must hold in our endeavor from the medical and hygienic side of war, to place every man in the front line F. L. D. In other words, we must study pathological conditions as they exist in a fighting man, in an active army. The loss of a working day is a serious menace to our efficiency, and especially is this so in the front line, where time and study have been expended in preparing the individual for a really technical job. Perfection is unattainable, and this fact is emphasized in the attempt to obtain perfection from the medical viewpoint. Delay at any stage is dangerous, from the landing on the coast, all the way to the front, the break in the chain often involving serious consequences. Disease and injury must ever be present in a mobile army, but to minimize their effects is a task set to the Medical Corps. The accusation of the tonsil, a useless organ in the body, as a menace to the efficiency of the Army appears at first glance to be drawing on our imagination or perhaps looking at the question through the eyes of the specialist. When I give you figures showing the actual loss in working days to our Army and Navy in peace times, you will be willing, I am sure, to give to the diseased tonsil the consideration it deserves. Quoting from memory from statistics furnished by the Bureau of Medicine, Washington, a few years ago, I found that for the previous ten years there has been a yearly loss of some 10,000 working days to the Army and either 15,000 or 16,000 to the Navy. This was the largest single cause next to gonorrhea.

The wardmaster [2] has given me the following figures which represent the E. E. N. & T. services of this hospital under care from April 17 to May 26, 1918. They represent a mixed service of 158 patients; of these 56 were cases of tonsillitis or one-third of his special service; days in hospital 281, or 6 days for every case. This, added to a day or two off duty before and after admission, increases the loss of working days. These figures bear me out in a further investigation of the sequel of the diseased tonsils. In addition we must take into consideration the fact that it is extremely difficult to state positively whether a tonsil is diseased or not. This point is illustrated by diphtheria car-

[1] Paper read before Clinical Society of Camp Hospital No. 26 St. Aigneaux, France, June, 1918.

[2] At that time the camp hospital, consisting of 426 beds, was the center of an active service, St. Aigneaux being a replacement center.

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riers and is noted in bacterial growths from diseased follicles with cultures of various microörganisms to which medical observers trace many of the systemic toxic conditions.

The reports [3] received by me from various contagious hospitals show that ear complications, which added gravity in contagious diseases, were present in 98 per cent of the cases in which chronic hypertrophied tonsils or adenoids were found or demonstrable diseased tonsils were present. Vincent's angina shows marked tendency to attack the tonsil as well as the teeth among our troops, and I have no doubt that careful investigation will reveal many carriers of this disease in analogy to our diphtheritic carriers. The diseased lymphoid ring about the pharynx likewise acts as a carrier of the meningo cocci and forms an additional menace. To quote Coakley of New York: "It was extremely difficult to decide between the diseased and healthy tonsil; certainly not without a culture." What, then, must be our position in regard to the tonsil as encountered here in the midst of war, where every day of sickness means a serious loss in man power. I am told that a government order forbids the removal of tonsils unless diseased or sufficiently hypertrophied to obstruct breathing. Certainly we could not put a man with hypertrophied tonsils, who depends on the mouth for respiration, in the front line and expect him to wear a gas mask. As it is possible for the surgeon with comparative safety to remove the tonsil under a local anesthetic, and as the performance of this small operation requires at the most a week's absence of the patient from duty, there can be no doubt that we are justified in recommending such a course in all cases of:

1. Obstructed breathing due to tonsil hypertrophy.
2. History of previous attacks.
3. Bacteriologically diseased tonsils.
4. History of rheumatism, nephritis, heart lesions in connection with even a slight tonsil history. (Operation and cases.)

We publish the following letter and report at the request of the secretary, Medical Veterans of the World War, Col. F. F. Russell:

MEDICAL VETERANS OF THE WORLD WAR
OFFICE OF THE SECRETARY-TREASURER
ARMY MEDICAL SCHOOL, WASHINGTON, D. C.

THE EDITOR, *February 25, 1920.*
The Military Surgeon,

DEAR SIR:

If possible, will you consider the publication of the following letter, or so much of it as you deem suitable for your journal:

[3] Forbes: "Removal of Tonsil as a Prophylactic Measure." *New York State Journal of Medicine*, December, 1916.

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"*To all physicians who served the Federal Government during the war:*

"An association of Medical Veterans of the World War was organized at Atlantic City, in June, 1919, at the time of the meeting of the American Medical Association, and a constitution and by-laws adopted. About 2,800 physicians have already joined, and all others who are eligible are invited to join the society.

"The constitution states that 'The Dominant Purpose of this Association Shall Be Patriotic Service. The objects of this association shall be: To prepare and preserve historical data concerning the medical history of the war; to cement the bonds of friendship formed in the service; to perpetuate the memory of our medical comrades who made the supreme sacrifice in this war; to provide opportunity for social intercourse and mutual improvement among its members; to do all in our power to make effective in civil life the medical lessons of the war, both for the betterment of the public health and in order that preparedness of the medical profession for possible war may be assured.'

"The organization of the society provides for state and local organizations wherever the members desire it, and in some states, such as Wisconsin, organization has already been effected.

"It is desired by the national association that those who are already members meet together in larger and smaller groups, at the first convenient opportunity, and effect a local organization with a chairman and secretary, and also at the next meeting of the state medical society that a place be provided on the program for the Medical Veterans.

"The organization of the society is based on democratic principles, and it is hoped that the members who have already joined will take the initiative and organize their own state and local societies.

"The national organization will assist by furnishing application blanks and copies of the constitution and by-laws, and if desired, stationery.

"The first things to be done after the organization of a state society is effected is to elect a councillor to the general council of the organization, to represent the state society at the next annual meeting of the Veterans at New Orleans on the first day of the meeting of the American Medical Association, April 26, 1920.

"A badge or button for members of the society is being made and will soon be ready for distribution."

Yours very sincerely,

F. F. RUSSELL, *Secretary.*

March 1, 1920.

To the President and Trustees of the Medical Veterans of the World War:

I beg to submit the following report for the month of February, 1920:

New members who joined during the month..... 169

This makes the total membership 2,711, divided as follows:

1. Medical Corps, U. S. Army.....	1,245
2. Medical Corps, U. S. Navy.....	51
3. U. S. Public Health Service.....	62
4. Contract Surgeons, Army.....	88
5. Acting Asst. Surgeon, U. S. P. H. S.....	47
6. Member, Local Boards.....	527
7. Medical Examiner, Local Board.....	183
8. Member Medical Advisory Board.....	508
	2,711

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Last month the number of new members was	143
Dues paid in advance for second year	4
Circular letters were sent to 1,059 eligible physicians.	
Receipts for dues sent to	173
Bills mailed to	13
Letters returned because of defective addresses	18
Application blanks mailed in reply to requests	10

F. F. RUSSELL,
Secretary.

We publish the following at the request of the Denver Anti-Tuberculous Society:

WHY TUBERCULOUS PERSONS WITHOUT FUNDS SHOULD NOT LEAVE THEIR HOME STATES

It is a reliably estimated that several hundred tuberculous persons without funds come to Denver every year. Practically all of them come because they have the mistaken idea that climate will cure tuberculosis.

They arrive, almost penniless, without having made any inquiries or any provisions for their needs. Since Colorado has no state, and Denver no municipal tuberculosis sanatorium (merely a ward at the County Hospital for thirty-five very sick tuberculous residents), the care of such indigent persons is limited to a few free private sanatoria, which are continuously so overtaxed that admittance is a long and difficult matter. These sanatoria comprise the two Jewish, which accept only a small number of Gentiles; a tent colony of men with a capacity for seventy "down-and-outers;" and a small home for a dozen destitute tuberculous women.

These tuberculous poor who migrate to Denver, finding no place where they can be cared for, look for light work in order to maintain themselves and often their dependent families, but the demand for such work is far in excess of the supply. Driven to any work they can get, with neither friends nor care, anxious, homesick, hopeless, they rapidly grow worse, and usually soon die. They die for lack of proper rest, food, fresh air, and medical attention, those essentials of treatment which many of them could have had at home—or here with sufficient funds for two years' care. Without these essentials climate is of no avail. If it were, Denver would welcome these tragic health-seekers instead of urging them, for their own best chances, to stay at home.

Denver also urges that the states throughout the country plan definite programs to retain their indigent tuberculous, giving them effective treatment in state sanatoria or in their own homes.

THE DENVER ANTI-TUBERCULOSIS SOCIETY,
221 Coronado Building, Denver, Colorado.

We published the following at the request of the Officer in Charge of Recruiting Drive, War Department:

THE BENEFITS OF ARMY SERVICE

Regardless of his station in life or the educational advantages he may or may not have enjoyed, an enlistment in the Regular Army offers many advantages to every young man.

For success in life every man needs a foundation of sound physical health, neatness, character, reliability, initiative and willingness to as-

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sume responsibility as a basis on which to apply his education or special training. The Army offers to every young man the opportunity to develop all these qualities to an unusual degree.

Without robust health, his physical limitations prevent him from applying his knowledge and ability to the full extent of his possibilities. Without the qualities of character, reliability, initiative and sense of responsibility he must fail in life, however highly he may be educated or how skillful he may be in his trade or profession. Unless he has education and the specialized training required for his chosen life work, all the energy and steadfastness in the world will not bring success.

The physical benefits of Army training are so well known since the World War that they need little emphasis. Nearly every one has a brother or a cousin or knows a "boy next door" who came back to find that he could no longer wear his pre-war civilian clothes. The wholesome outdoor life, regular exercise, good food and physical training had changed him—made another man of him.

The nature of his life and duties tends to develop the other qualities mentioned to a high degree. The first impressions of a recruit are calculated to foster his responsibility and reliability. He is required to keep his rifle and equipment always in perfect condition, his clothes neat and clean, and his particular portion of the barracks in perfect order.

As he progresses in instruction and experience his responsibilities increase, and he is constantly called on to a greater degree to exercise initiative and to carry out instructions with exactness. While still a private he is, during his period on guard, solely responsible for good order and the protection of government property. His orders as a sentinel must be obeyed by all persons in the military service, regardless of what their rank may be.

As he progresses through the grades of corporal and sergeant his responsibility for his squad and platoon constantly increases. In learning how to carry out orders he has learned how to give them and to see that what he requires is done. The sense of authority thus developed makes him a leader of men and one whose leadership is instinctively accepted by others.

Loyalty, responsibility and initiative are the principles on which all armies are founded. In few other occupations are these qualities developed in such a high degree. The army "graduate" is fitted by his training to take his place as a more useful citizen and a better American.

To the man who has been unable to complete his education or who wants special training along some particular line, the Army offers great opportunities. The slogan, "Earn While You Learn," has been widely used in connection with army educational and vocational training facilities and well expresses the chances offered to an ambitious young man.

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Every post has well-organized schools for the teaching of common school branches, and high school subjects are given at all the principal posts. Several schools have been established in which the soldier is given an opportunity to prepare under West Point graduates for entrance to the United States Military Academy at West Point, and numerous appointments to the Academy are made from the ranks of the Army every year.

Opportunities are also offered for training in trades. By choosing some branch such as the Air Service, Ordnance, Tank Corps, Signal Corps, Field Artillery or Motor Transport Corps, the soldier can secure thorough training in almost any mechanical or electrical trade which he may select.

Ample time during the day, apart from his military duties, is given the soldier to pursue his studies in both educational and vocational subjects.

During the time he is thus fitting himself to be a more useful and productive citizen the soldier is well paid instead of being required to pay for his own education or to accept small wages as an apprentice. His monthly pay is not less than $30 a month in addition to all his clothes, board and other living expenses and medical attention. Few young men just starting out in life can show this amount clear at the end of the month after paying their living expenses and buying their clothes. Thirty dollars is the lowest rate and increases substantially with length of service and promotion.

"All work and no play" is no more the policy in the Army than it is elsewhere, and ample provision is made for the soldier's entertainment and amusement. All sorts of athletic games are encouraged and the necessary equipment supplied at government expense. Every post has its Service Club, open to every man without cost and provided with games and reading and lounging rooms. Club rooms are also maintained by most companies where similar facilities are provided within the barracks. Nearly all posts have their Liberty Theaters with regular motion-picture programs and frequent plays by both amateur and professional talent.

To sum up, the Army offers a man an unusual opportunity for physical improvement and the development of those general qualities which make for good citizenship and success in life. If he wants more education or desires training in some special subject or trade, he has full opportunity to obtain them. During this time he is well cared for, generously paid, and not only allowed but encouraged to indulge in interesting and wholesome amusements. His life is well balanced, and at the expiration of his enlistment he is well fitted to take his place as a better and more useful member of society.

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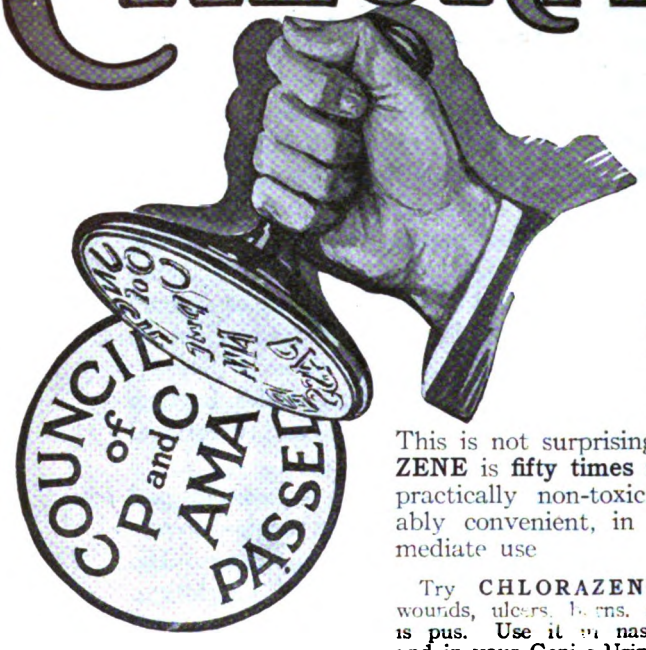

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THE
MILITARY SURGEON

VOL. XLVI MAY, 1920 NUMBER 5

ORIGINAL ARTICLES

Authors alone are responsible for the opinions expressed in their contributions

THE FUNCTION OF MEDICAL AND SURGICAL CONSULTING STAFFS DETERMINED BY THE EXPERIENCE OF THE LATE WAR

THE WELLCOME FIRST PRIZE ESSAY, 1919

BY COLONEL JAMES L. BEVANS,
Medical Corps, U. S. Army

(With five illustrations)

THE armistice cut short the evolution of a complete plan for applying the activities of the consulting staffs in the rapidly expanding army. The difficulty encountered in effectively utilizing the immense resources of the medical profession in a time of military crisis was a part of our national unpreparedness. The roots of the trouble go deep into military and medical organization.

The problem is to so list and classify the medical personnel of the nation that its resources may be known; to arrange in peace time for the mobilization for war of such part as may have military value; to so mould this civilian mass as to give it a place in the army machine. Definite changes in the Medical Department, to be included in the Tables of Organization, and to be accurately outlined in Regulations and the Manual for the Medical Department, are necessary. Some form of coördination to bring the Medical Department and the profession at large into permanent contact is indicated. It is timely, therefore, to make a considered study of the experience of the World War in order to afford the future a solution of the problem.

If one turns to a pre-war Manual for the Medical Department, he will find in the paragraphs devoted to general hospitals about the first indication of a formulated division of the functions of medical officers into those pertaining to administrative duties and those having to do with the purely professional. A Professional Division, with Chiefs of Medical and Surgical Services, was established by these regulations for general hospitals. For a very long time, medical officers have been given assignments in accordance with their qualifications, but specialism

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has not been recognized either in the Tables of Organization or in the Regulations. The subjects for promotion examinations were changed about ten years ago in such a way as to indicate that a plan was on foot to permit medical officers to choose a career along either professional or administrative lines, but in general the tendency has been to give medical officers administrative assignments as they advanced in rank, and not to develop them in medical specialties.

Before the war professional matters were handled in the Surgeon General's Office by the Division of Sanitation. A separate division for purely professional service was not included in the organization. It is interesting to follow the development of the professional divisions as the office expanded with the war.

On May 24, 1917, a Division of Field Sanitation was established, with sections of inspection, communicable disease, sanitary engineering, current vital statistics and personnel.

The Hospital Division was created in July, 1917. In carrying out the program for the care of sick and wounded both in the United States and abroad the division issued a set of regulations governing the internal administration of base hospitals and recognized the professional branch by providing for three sections, surgical, medical and laboratory, with a chief for each, and further by including under the sections a number of special sections. In the surgical section, there were subsections for general surgery, including that of the chest and abdomen, and fractures; for surgery of the head, to include the brain, eye, ear, nose and throat, and plastic work on the face and mouth; for orthopedic surgery; for urology; for roentgenology. The medical section embraced general medicine, neurology and psychiatry. The laboratory section comprised pathology, bacteriology, serology, chemistry, post-mortem and public health work.

The Division of Laboratories and Infectious Diseases was organized in the Surgeon General's Office in June, 1917. Its first section concerned laboratories and infectious diseases, exclusive of venereal diseases; the second section was for combating venereal disease; urology and dermatology occupied the third. This division did a great deal of work which brought the Army into association with civilian organizations, both lay and medical.

The Division of Internal Medicine came into existence early as a result of the necessity for the reëxamination of the Army for tuberculosis; the cardio-vascular section was added. The division had an important duty in selecting chiefs of medical service for base and other hospitals and generally in mobilizing and classifying the medical personnel of the country.

When the Division of General Surgery was established it also engaged in the classification of members of the Medical Reserve Corps as to their qualifications in surgery. It provided schools for surgeons and studied the question of the standardization of surgery and of equipment. Hospital staffs were inspected; surgical teams were organized; there were investigations and consultations with reference to special surgical problems.

The orthopedic surgeons were early in the field. Their two national societies had been interested in war problems in 1916; committees were appointed by each society and a joint chairman was named. In May, 1917, the chairman was commissioned and went abroad. In July, 1917, an advisory council for orthopedics

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was placed in the Surgeon General's Office, and from this the Division of Orthopedic Surgery developed.

The Division of Surgery of the Head included the sub-section of ophthalmology, which was organized early, and otolaryngology, which continued the work already started by the sub-committee on otolaryngology of the Council of National Defense. The section of brain surgery followed in July, 1917.

A Division in Neuro-Psychiatry was established, and in August, 1917, a Division of Psychology was split off from it.

The Medical Division of the Air Service was organized September 6, 1917.

These divisions were apparently not organized in accordance with a definite program, certainly not because they were included in the Tables of Organization, but because of an imperative necessity for their establishment. At once each important branch found itself faced with the problem of obtaining adequate personnel and began to comb official and unofficial lists for the names of qualified men, and to classify them. In reviewing the activities of the various divisions it will be found that if they did not originate in the Council of National Defense and possess at the beginning close contact with the profession at large, they at once sought to bring themselves into effective liaison with non-military organizations and persons of similar interests; thus the Surgeon General was given the advantage of constant and intimate touch with the medical profession in civil life, and, of even more importance, the members of the profession at large were given promptly an accurate estimate of the medical thought and needs of the army. It is necessary to emphasize the fact that a definite program was not in evidence; there was no officer or unit for the close coördination of the various professional divisions. Even a skeleton program and organization would have prevented much overlapping of activities; mistaken zeal exerted in behalf of certain specialties would have been controlled; the different branches would have found themselves in their proper relative positions of importance and the new divisions in forms not far different from those to which the army was accustomed.

In France, the office of the Chief Surgeon, American Expeditionary Force, was organized with five divisions: Hospitalization, Evacuation and Hospital Administration, Sanitation, Sanitary Inspection and Medical Statistics, Personnel, Medical Supplies, Finance and Accounting. No separated division was established for the professional services, although the director, after he was named, came under the Division of Hospitalization, Evacuation and Hospital Administration.

The Chief Surgeon outlined the plan of organization for the professional services in Circular No. 2, dated November 9, 1917. (See Appendix I.) The divisions established were about the same as those in the office of the Surgeon General. Each division had a director in the United States and one in France. The divisions

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were eight in number, covering general medicine, general surgery, orthopedic surgery, surgery of the head, urology, including venereal, skin and genito-urinary diseases, laboratories, psychiatry and roentgénology. Assistant directors and consultants for corps, sections of the lines of communication, larger hospital centers and other areas were mentioned as future officers. It was emphasized that professional authority did not include administrative control. Directors were held to be immediately responsible to the Chief Surgeon for the work performed in their divisions and were to "direct and coördinate the professional service of all sanitary formations and hospitals" to provide for "continuity of treatment along the lines of recognized, approved practice, from the front to the rear." Finally, the professional service of base, general and other hospitals was to be organized, so far as practicable, into eight sections corresponding to the divisions and suitable officers assigned to the sections by commanding officers of the hospitals. Professional qualifications were to be considered in making these assignments and the head of each section was to be responsible to his commanding officer for the particular section concerned.

A critical reading of this circular, which was basic, reveals certain weaknesses which must be considered, if experience gained during the war is to be made of value. There were already divisions fighting at the front and divisions in the office of the Chief Surgeon. The addition to the nomenclature of professional divisions added to the confusion. All of the specialties were coördinate, orthopedic surgery, for instance, not being subordinate to general surgery. The title given to Directors of Divisions seemed to imply administrative control which was interdicted. To direct and control the professional service of all sanitary formations, to establish continuity of treatment from front to rear, to change professional procedure and inaugurate new methods, were some of the duties placed upon the directors; is it cause for wonder that professional and administrative control were sometimes confused? The only coördinating element in the plan rested with the Chief Surgeon, already overwhelmed with the responsibilities devolving upon him.

It is necessary to visualize the situation of the directors of the new services as they were assigned to duty, in the fall of 1917, to comprehend the difficulties of their task. They were congregated at Neufchateau, 45 miles from Chaumont, where the Chief Surgeon was then located. No office force was at first provided. Transportation was scant and communication by mail and telephone was difficult. Three or four combatant divisions were in France, struggling with their own affairs. Headquarters itself was in the throes of organization. The new directors lacked military experience and each was naturally an enthusiast in his own specialty. The tendency was for each of the uncoördinated branches to solve its own difficult problems. Neither the division surgeons nor the directors knew how plans for expansion, if such plans existed, were going to work out in the new army.

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During November of 1917 I had a conversation with one of the directors, which was so explanatory of the confusion then existing that the gist of it is here given. The director said that he had been made responsible for the professional work of his branch for the army in France and that he was to see that there was continuity of treatment for the soldier from the front lines to the rear. He had been thinking of the magnitude of his task and was able to see how he could supervise the work of the medical officers in the front lines so that soldiers could receive the proper treatment. He was also ready to believe that the hospitals in the rear could be so organized as to perform professional work of a character about equal to that done in civil life. His great problem seemed to be to arrange for the transportation of soldiers needing the services of his special division from the firing line to the base. He had contemplated going to Paris to talk over with a great non-medical authority this part of his task. It developed that his idea of the organization of Medical Department transportation did not go much beyond the movements of individual ambulances and that he had no knowledge of sanitary trains, ambulance companies and the other units, nor of the immense amount of thought which has been given to the question of medical transport from the days of Baron Larrey, through those of Letterman, to our own time. The conversation brought out graphically how complex was going to be the definition of the line between professional and administrative control. As a matter of fact, this director had nothing to do with transportation.

General Orders No. 34, which prescribed a nearly complete and independent system of evacuation and hospitalization for venereal cases alone, is another good example of the sort of thing which arose from the overlapping of interests, mistaken enthusiasm and misconception of military organization existent in the special divisions. The fact that such an order was approved for publication tends to demonstrate both a lack of coordination of the special services with other branches and a great willingness on the part of the Army to accept the advice of the specialists who had recently joined.

It is very certain that the directors in those early days had an inadequate conception of the different administrative zones which their new duties would require them to enter, and of the barriers which regulations and custom have raised between these zones and which they would have to break down completely or take at hazardous jumps. There was much dashing to and fro to find out things which a quiet study of Regulations, the Tables of Organization and the Manual for the Medical Department, or a short course at a School for Medical Officers, would have taught.

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When junior members of the special divisions began to arrive and were assigned to combatant divisions, the complications increased. They were not recognized in the Tables of Organization, and the details of arranging for billets, messes and transportation were therefore difficult. The towns in which headquarters of divisions were located were usually small and crowded. The general, his personal aides, and the general staff sections were billeted together and had one mess. The heads of the departments, including the division surgeon and sometimes the sanitary inspector, had another mess; there were one or more junior messes. Usually there were not enough medical officers to form a mess, nor was it considered good policy to separate the division surgeon from his colleagues in the other departments. So it came about that the specialists found themselves either assigned for billet and mess to hospitals over which the division surgeon had control, or at division headquarters in a mess consisting of transients and officers of junior rank. Assignment to hospitals separated them from the division surgeon, because medical organizations were not usually in the same town as headquarters, and it placed the consultants in an isolated position where they could not best perform their functions, which were divisional in their application. These complications now seem trifling, but they led to the disturbed feelings which impaired the usefulness of the junior consultants.

Division surgeons were usually of the Regular Army and trained along the lines of military administrative control. The specialist presented a new problem, and one of which the division surgeon had not been sufficiently informed. One can readily understand his problem by considering the arrival of two officers, one reporting as a medical officer and the other with orders for assignment as division urologist or orthopedist or psychiatrist. The first was assigned to a battalion or a field hospital by the usual orders. His place was fixed by the Tables of Organization and was understood by all. He expected no special transportation and joined his organization for any duty assigned him and found his recognized place in billet and mess. The other probably arrived in an automobile loaned him by the Red Cross or by his special division. Perhaps he had a letter of introduction to the division surgeon. At least he bore papers showing that he represented a special service and was to be a part of the office of the division surgeon. The division surgeon, being loyal, greatly desired to carry out the policy implied in this officer's arrival. He had the choice between taking him into his own overcrowded office, forcing him into a mess where he was not wanted because of inadequate facilities, and because he did not hold one of the positions which entitled him to membership, urging a harassed billeting officer to make room for him in a jammed headquarters town,

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or sending him to a hospital where also he was at once regarded as a person apart. If placed at the hospital, the question at once arose as to whether he was under the commanding officer, whether he could go and come as he pleased, whether he was to personally care for patients, whether he went on as officer of the day. If he had a machine, was the unit to maintain it and supply the gasoline, and if not, how was he to make his inspections of a division occupying a line of some 20 miles or a billeting area of many towns? The specialist was thus brought out in sharp contrast to the average medical officer. If he was not tactful, and he was not always so, his position was a difficult one. The division surgeon found it hard to make the arrangements even in billeting areas, and when battle conditions ensued the situation was almost impossible.

There was a double allegiance due from the consultant, to his director and to his division surgeon, which he frequently did not understand and exercise with wisdom. Analyzed, it was really the staff relationship, which is as old as the army, but the new officers had not the military experience to grasp it. The division surgeon was often importuned to carry out projects which he regarded as impracticable or which, if practicable from the medical point of view, were disapproved by higher non-medical authority for local reasons; sometimes he was made to feel that the suggestions emanated from higher authority and that if he failed to follow them he would meet the displeasure of this vague power. These were examples of staff action improperly applied.

By the spring of 1918, several divisions were in the firing line and additional divisions were arriving rapidly. As corps and armies were formed, the complexity of the situation for the special divisions increased normously. All of the little animosities which have been hinted at in previous paragraphs were in full play. Medical officers in administrative positions, as well as the specialists, knew that a defective scheme was in operation. The office of the Chief Surgeon had moved to Tours, while the headquarters of the special divisions remained at Neufchateau, partially controlled by a Director of Professional Services, who had his headquarters at Chaumont. All branches were still coördinate and there was much confusion of activity, too many orders, too many reports, too many inspection trips; uncoördinated ideas were surging up from below and until April there was lack of effective administration from above. The functions of the specialists were not well defined and there were many different methods of handling the problem of the special branches.

It was interesting to observe the ways in which the administrative medical officers of divisions, corps, and armies, worked out the problem of the special services. There were those who took advantage of the advice given by the specialists and tried to apply it to the military

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machine in an orderly way. Others, harassed by their many responsibilities, followed the plan of keeping the specialists busy, too busy, as the saying was, to allow them to think up new schemes. Another class of men advocated getting them out of the way by sending them off on long trips of inspection or on special missions. Still another policy equally unfortunate in its results was to follow blindly the recommendations of the consultants, putting the blame upon them when their overly enthusiastic ideas proved impracticable of application in the military service.

Some of the special services had obtained an earlier start on organization than others. Having been associated in those early days with the Director of the Division of Orthopedic Surgery, I have always had in mind the work of that branch when considering the great advantages accruing from the establishment of the Professional Services in the Army. Major (later Colonel) Joel E. Goldthwait crossed the ocean for the second time in October, 1917. He had made one trip to England to study the organization of the orthopedic surgeons in the British Army and had returned to Washington to report his findings, with recommendations, to the Surgeon General. During his second trip he was accompanied by some fifty orthopedic surgeons selected by him for duty, first in England and later with the American Army in France. He occupied his entire time during the voyage giving instruction in both orthopedic surgery, as applied in military life, and the details of Army Regulations and customs and administrative methods, to these junior officers, and in obtaining from medical officers of the regular establishment, who happened to be aboard, further knowledge, for his own use, of the usual army methods of dealing with medical problems. He was busily engaged in reading Army Regulations, The Manual for the Medical Department, and the Tables of Organization. He realized that the Army was an ancient, essentially conservative institution which could not be made over in a day, because it was a part of the evolution of nations and represented the product of so many minds that it could not be greatly and suddenly changed by the enthusiasm of any one man. He knew well enough what he desired to do for the Army and what his specialty offered it, but his concern was to learn to work with the organization along accustomed lines. Because of this study, when he arrived in Neufchateau, where one combatant division was already established, he was able to understand promptly how he could best apply to this pioneer division what he later desired to put into effect for the entire army.

One of Colonel Goldthwait's early activities was typical of the good which the special branches were able to accomplish and illustrates how

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quickly a man recently from civil life, if he approaches the problem in the right way, can accomplish things in the military establishment. There were a great many men in the combatant division then in Neufchateau who had physical disabilities, of which flat foot was the chief example. Colonel Goldthwait had observed, during his first trip to Europe, how the British handled these men, and desired to have the opportunity to do the same in the American Army. He therefore approached the division surgeon with a scheme which answered the professional requirements and asked him to apply it in a military way; so teamwork came into play and an organization was presented to the commanding general which at once obtained his approval, and the Orthopedic Training Battalion came into existence and accomplished such excellent results that it was later applied on almost the original lines to the whole army in France.

Really there were such immense advantages in connection with the organization of consulting staffs that there was regret that these valuable services, generally, were being allowed to make their own way and were getting so poor a start due to lack of a definite program. The office of the directors at Neufchateau was gradually organized and was assigned an adjutant and other personnel. Although much time was lost, many good things came out of the office, in the form of advice to the junior consultants, special manuals, such as the Splint Manual, and circulars dealing with the prophylaxis of venereal disease, the prevention and control of epidemics, and many other subjects. After April, 1918, when he was appointed, and particularly after the new organization orders were issued, Col. William L. Keller, Medical Corps, as Director of The Professional Services, solved many problems and with great tact and patience performed his most harassing task. Circular Letter No. 25 was issued from the office of the Chief Surgeon in June, giving definite organization to the Professional Services. This circular was based upon and elaborated General Order No. 88, G. H. Q., A. E. F., June 6, 1918. With minor modifications the organization established by it was still in existence at the time of the armistice, and it must, therefore, be accepted as the result of the experience gained in the World War.

An analysis of the circular in question (see Appendix II) shows that there were named for the American Expeditionary Force a Director of Professional Services with a Chief Consultant, Surgical Service, and one for the Medical Service, and, in addition, Senior Consultants in the special subdivisions of Surgery and Medicine, Division Specialists and Consultants for Base Hospital Centers, and other formations.

The functions of the director were to "supervise the professional activities of the Medical Department, A. E. F., and coördinate the work of the consultants and specialists of the Medical Department."

The chief consultant of the surgical service was to supervise the surgical sub-

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divisions and organize and coördinate them in such a manner as would permit him to anticipate necessary changes in the personnel. He was made responsible for the proper formation of surgical teams, maintaining lists and records of the teams, receiving the monthly reports of the teams, and he was to make recommendations regarding inspections as to technical procedure and instruction, the detailing of operating surgeons and of members of the teams and the appointment of surgical consultants.

The chief consultant of the medical service was directed to supervise all medical subdivisions and make the necessary recommendations to insure a high professional standard and complete harmony among his assistants.

Senior consultants, under the supervision of the director of professional services and the chief consultants, coördinated professional activities relating to their specialties and made recommendations regarding instruction of consultants and specialists working under them.

Senior division consultants were appointed to tactical organizations, the equivalent of an army corps, and supervised the work of the division consultants. The term was made necessary by the fact that at the time Circular No. 25 was issued there was doubt as to whether corps would operate as administrative units or not, and senior division consultants really were corps consultants.

The chief function of the senior division surgical consultant was to make such frequent visits as would afford a complete survey of professional instruction, surgical technique and methods of treatment in use in the various divisions, and to render such reports and recommendations to the chief surgical consultant as would promote a free interchange of suggestions and effective coördination with the other professional services. He was a supervisor of the professional activities of all consultants, operating teams, and operating surgeons under him, and he was supposed to study the individual capabilities of the men with a view to their selection as useful members of modern surgical teams. Responsibility for the organization, efficiency and distribution of surgical teams was placed upon him so that there might be available a sufficient number of these teams to meet the increasing demands of new formations arriving in France. He was expected to coördinate the activities of his branch in the divisions, to bring about high surgical standards with elimination or reassignment of those who fell below the requirements, and he was to spare no effort to promote professional harmony and unity of treatment.

The senior division medical consultant had similar duties.

The division surgical consultant was required to supervise the immediate surgical activities of operating teams within his division, and, during active periods, if evacuation hospitals were not established, to look after the operative work of teams handling non-transportable cases, the teams themselves, however, to be under the senior division surgical consultant.

Division medical consultants supervised the immediate medical activities of the division.

Circular No. 25 outlined the relation of the division surgeon to the consultants somewhat more fully than had been done formerly. It stated the division surgeon would be so occupied with details of organization and administration, with the care of sick and wounded and their evacuation, that it was not believed that responsibility for technical surgical work, which at times it was necessary to do within the division, should fall upon him; therefore, the direction and supervision of the purely operative side was assigned to the surgical consultant. It was made clear that the division surgeon was to supply the necessary hospital facilities, supplies and personnel,

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except of the teams, and he was to spare no effort in promoting harmony. An orthopedic surgeon, a urologist and a neuro-psychiatrist to be appointed from the division medical personnel were to perform their special duties under the direction of the division surgeon, and, in addition, such other duties as the exigencies of the service might require.

Consultants for hospital centers were to be appointed on the recommendation of the chief consultants in medicine and surgery, and the organization of base and general hospitals and other hospitals, so far as practicable, were outlined in the following table:

ORGANIZATION OF BASE AND GENERAL HOSPITALS

Surgical Services:
- Chief of Service—
  - 1st Section—General Surgery..... { General. / Chest / Abdomen / Fractures.
  - 2d Section—Orthopedic Surgery
  - 3d Section—Urology.
  - 4th Section—Head Surgery..... { Brain (also Neurological). / Ear, Nose and Throat. / Eye. / Oral (Face and Mouth).
  - 5th Section—Roentgenology.
  - 6th Section—Dentistry.

Medical Service:
- Chief of Service—
  - 1st Section—General Medicine.
  - 2d Section—Neurology.
  - 3d Section—Psychiatry.

Laboratory Service:
- Chief of Service—
  - 1st Section—Pathology.
  - 2d Section—Bacteriology and Serology.

The policy announced in Circular No. 25 was the culmination of the reorganization of the special services begun by the appointment of Colonel Keller as Director of The Professional Services. It will be noted that coördination of the different branches was assured through a director. The specialties were also arranged in proper relationship by giving medicine and surgery predominant position over the lesser branches like orthopedic surgery, urology and psychiatry. The new titles unfortunately did not conform to the usual nomenclature of the Army. However, Circular No. 25 was a long step in advance of Circular No. 2, on which the original organization of the special services was based. A very long period of defective organization had ensued before Colonel Keller took hold of the situation, and by the time his system and the circular, abstracted above, had come fully into operation the American Army was intensely busy, and there was little time for

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doing much else than stopping up the gaps from June until the armistice arrived.

The immense amount of work done by the special divisions must not be forgotten because of a too detailed consideration of the mistakes of the system. A review of some of the reports of the heads of special divisions will show how important was their contribution.

Brigadier General J. M. T. Finney, Medical Corps, Chief Consultant of the Surgical Service, in his report of December 30, 1918, stated that fairly satisfactory results were obtained so far as the wounded man was concerned. Situations had arisen which demonstrated the necessity for changes in the Tables of Organization, because it had not been possible to fully visualize the needs of his division as a whole and its relation to the sub-divisions and other sections, such as medicine and laboratories. General Finney's appointment on November 10, 1917, the establishment of the office in Neufchateau on January 28, 1918, and the changing of the title of director to that of chief consultant on June 6, 1918, were successive steps in the organization. The appointment of a surgical consultant to each of the four divisions first in France, with the idea of instructing medical officers in their clinical duties, and giving them the benefit of the experience of the consultants with the Allies was one of General Finney's first acts as director. (NOTE: In fairness, it should be remarked that the consultants, while instructing in clinical duties, were themselves taking a much needed course in the organization of the combatant division.) When the divisions went into the line, General Finney found that the services of the consultants were of greater value in the hospitals where definitive surgery was done, and that locating consultants in divisions prevented them from following the treatment of cases through to the hospitals in the rear, because more than one division evacuated to the same hospital. According to General Finney's report, it appears that surgical consultants were appointed to corps when it was assumed that corps were to be mobile, but after the organization of armies, consultants were withdrawn from the very mobile corps, and the solution for the difficulty was to name an army consultant, with sufficient assistants, to carry out the work, and this was put in force in the First and Second Armies, and proved successful for the short time it was in operation. At first base hospital personnel was utilized for the organization of surgical teams and the circular letter of January 7, 1918, led to the formation of fifteen additional ones. Some teams were trained at Evacuation Hospital No. 1, located at Sebastopol in the Toul Sector, but when the activities in the battle line became extreme even teams untrained in military surgery had to be utilized. This was the natural result of not having a sufficient reserve of trained surgeons and because base hospital commanders made it a point to be allowed to keep their own trained men. It was not long after the period of activity began before the necessity for surgical consultants in the large hospital centers became manifest, but such assignments could not be made until late in the war because of the scarcity of trained men. By December 30, 1918, the date of General Finney's report, sixteen of the centers had consultants. Their functions were to supervise, instruct and classify surgeons. Conferences between surgeons on duty in the front lines and in the rear areas had been planned, but were always carried out with great difficulty. Representatives of General Finney's office made frequent inspections of base hospitals and elsewhere, but he remarks that no real follow-up system was established by the Medical Department. The Surgical Service actively concerned itself with studies of a professional character. In January, 1918, a committee was appointed

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to find the best method for the transfusion of blood. A special team was organized for surgical work on the thorax and it was organized to carry out certain special observations. The splint teams of the orthopedic subdivision saved the general surgeons a very great deal of work. The shock teams which really pertained to the surgical service had to be manned by medical men because of the shortage of surgeons. A good deal of experience was gained by surgeons belonging to base hospitals by assigning them to mobile surgical hospitals; also the monotony of existence in the rear areas was broken by these tours of duty near the front lines! Many lectures were given at the Sanitary School by representatives of the surgical service.

Brig. Gen. W. S. Thayer, Medical Corps, Chief Consultant of the Medica. Service, opens his final report with observations which show that he recognized the defects in the system of which he was a part. Most of the medical officers of the Regular Army, he remarks, were required for administrative positions and the practice of medicine devolved upon members of the Reserve Corps recently from civil life whose qualifications were unknown. Selection and supervision were very necessary and directors were chosen not only on account of their achievements as professional men but because of their large acquaintance, which made it possible for them to inform the Chief Surgeon as to individuals. Assignment to the office of the Chief Surgeon had been expected and the establishment of a separate office at Neufchateau was regretted. General Thayer mentions the difficulty of making inspections over large areas with the limited transportation available, but such inspections as were made revealed unevenness in the character of both personnel and practice in the different base hospitals, divisions and in the service of supply. One director and assistant director could not possibly cover the ground, and consultants for certain areas were named. Internists were indispensable in actual practice and the assignment of many additional officers qualified for these positions was requested by cable. Medical officers in the front lines were not sufficiently skilled to care for shock and gas cases, and there proved to be insufficient personnel in the surgical service for the formation of shock and gas teams; therefore, emergency medical teams were formed by General Thayer's division. When the army became actively engaged in mobile warfare the emergency medical teams were chiefly called upon for the treatment of shock cases. This was a purely emergency measure and would have become unnecessary with the increasing knowledge among the medical officers at large. (NOTE: While General Thayer does not mention it in his report, it should be remarked that the bewildered medical officers in the front lines of the Army never did quite straighten out the involved nomenclature and know exactly how to distinguish between gas teams, shock teams, gas and shock teams, and emergency medical teams. As a matter of fact, they were all the same.) The Medical Service gave many lectures at the Sanitary School at Langres.

Psychiatry was established as a division with Major, later Colonel, Thomas A. Salmon, Medical Corps, as director, but it was afterwards subordinated to the Medical Service. Even before the establishment of the Medical Service, Colonel Salmon had placed psychiatrists in the various units. He had a fine base hospital for the care of patients requiring treatment by his section at La Fauche, and also a number of army psychopathic hospitals at the front. Specialists of his branch were found to be so valuable in making expert examinations of defectives and of men about to be brought to trial by court-martial, as witnesses during trial and as experts in the examination of men alleged to have self-inflicted wounds and for the treatment in front line hospitals of soldiers suffering from war neuroses and psychoses,

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that the psychiatrist was retained throughout the war in the combatant divisions and his place there was finally recognized in orders. So far as the combatant divisions were concerned this was true of only two other specialties, urology and orthopedic surgery. The work of Colonel Salmon and his colleagues in the education of officers and men concerning the war psychoses was one of the most valuable contributions made during the war.

Another subdivision of the Medical Service was that headed by Lieut. Col. Gerald B. Webb, Medical Corps, of Tuberculosis. One of his first activities was to establish a careful nomenclature, his recommendation having been to include under "Pulmonary Tuberculosis" only those cases with tubercle bacilli and to place all others under the heading of "Tuberculosis Observation." Three centers for the treatment of tuberculosis were established at Base Hospital No. 8, at Savenay, Base Hospital No. 20 at Chatel-Guyon, and Base Hospital No. 3 at Vauclaire. Many visits were required to standardize clinical X-ray and laboratory methods of diagnosis. Much literature was prepared and distributed to chiefs of medical services and to medical officers showing preference for work with tubercular patients. There were also contributions to the weekly bulletin of the Chief Surgeon's office. Diversion of specialists from their own work in tuberculosis was common among the combatant divisions, as was the case with so many other of the specialists.

Of the other branches of the Medical Service, Lieut. Col. Richard Dexter, Medical Corps, had charge of the sub-section of Gas-Poisoning, and occupied himself in instruction and personally aided during the Argonne campaign. Col. Warfield T. Loncope, Medical Corps, in the sub-section of Infectious Diseases was very active in visits and inspections, and made many valuable reports. He also helped to bring the clinical side of medicine into closer touch with the laboratory division.

The Division of Orthopedic Surgery has already been mentioned. It was one or two weeks after the declaration of war by the United States that England requested this country to send base hospitals and at least twenty orthopedic surgeons to England. Colonel Goldthwait selected the orthopedic surgeons and accompanied them to England, and there studied the English service, returning to the United States to report his views to the Surgeon General. At this time splinting was discussed and a board was appointed; the publication of the "Splint Manual, 1917," resulted. Colonel Goldthwait was appointed Director of the Division of Orthopedic Surgery, with Colonels Nathaniel Allison and Robert G. Osgood, Medical Corps, as assistants. Colonel Goldthwait explains in his report the method used for the correction of static defects such as flat foot, weak back, weak knees which occurred commonly in the soldiers who arrived in France with the early divisions. The Special Training Battalion which was originally established in the 26th Division was transferred later and in enlarged form to St. Aignan-Noyers, this at a time when the replacement and reclassification systems were thoroughly organized. In July, 1918, stress for Class C men was so great that efforts to bring defectives up to standard for entry into the higher classes ceased, and short periods of training sufficient to fit men for Class C, and no more, were given. Colonel Goldthwait reviews the large amount of work done in training medical officers in the use of splints. Orthopedic surgeons had to be withdrawn from the British Army and assigned to the American Army for the purpose of examining all the men for defects, to make what efforts they could to have men properly shod and, as has been stated above, to train medical officers in the application of splints. Certain representatives of the Division of Orthopedic Surgery also were given charge of the storage and distribution of splints. Splint teams were organized to supervise splinting, this being necessary not only

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in the front-line hospitals but also in transferring men from one hospital to another in the rear. Standardized positions in which to splint the various bone and joint cases were announced and taught; thus travel in France and to the United States was greatly facilitated. Another important work was the organization of the corps of Reconstruction Aides, making it possible to apply physical therapy including occupational therapy. Curative workshops were established.

The Division of Urology was one of those which afterwards became a part of the Surgical Service and made an early start through the appointment of Col. Hugh Young, Medical Corps, who reported June 8, 1917, and then began a study of the British and French services. The Manual of Military Urology was one of the productions of this division. The adoption of a new Regimental Infirmary Urological Set was another. A proper stock of drugs for the special work of the division was acquired at an early date. It was Colonel Young's idea that the establishment through the Red Cross of infirmaries for the treatment of general diseases among the civil population of France would develop the existence and make possible the treatment of venereal infections, thus minimizing the danger for American soldiers. After much work such an infirmary was completed and put into operation at Neufchateau on March 15, 1918. Various routes centering at this institution and covering an area of some 50 miles were established. Properly taught urologists were trained in the new methods at the base hospitals and placed at the ports and with the combatant divisions. Camps for the treatment of venereal disease were established by many of the divisions, but it was later conceived to be a better plan to designate one of the division field hospitals for the treatment of these cases. Camps were permanently maintained, however, with the depot divisions, and there was a very active campaign carried on at the ports. One of the most drastic measures taken during the campaign against venereal disease was the publication of the memorandum of November 25, 1918, which required retention in France of all infected officers and men. The American Red Cross Military Hospital No. 9 at Paris was devoted to the work of the Division of Urology and had three main purposes, the treatment of venereal cases, to act as a school for urologists and to serve as an experimental station. Much work was done by the Division of Urology with regard to the prevention and treatment among American soldiers of scabies and pediculosis.

Surgical Research conducted by Col. G. W. Crile, Medical Corps, was an important sub-section of the Surgical Service. Numerous general researches were carried out and many practical surgical problems studied. Colonel Crile thinks there should be established a Division of Research for the whole of medicine rather than for surgery only, the Board to consist of the senior consultants in medicine, surgery and laboratory, one of these to be selected as chairman. He believes that the activities of the Division of Research should include cooperation with the hospital units and individuals suggesting ideas, supplying them with means for research. He suggests that there should be fuller coordination between the laboratory and clinical side of research. He would establish observation wards and pathological laboratories in the hospitals. He believes that methods in the front areas should be scrutinized and results observed as far as the base where the end results are known. He thinks that a bureau of information should be established in connection with a large library. Colonel Crile says that the casual visits of the consultants are only superficially informing and that consultants should maintain active association with both base and forward hospitals and from time to time have active service. The Red Cross made a fund available for the immediate purchase of supplies and

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apparatus for research, but Colonel Crile thinks this fund should be furnished through official channels. He emphasizes the importance of maintaining clinical contact for all the work done by the Division of Research. He believes that the headquarters of the Research Division should be at the headquarters of the Professional Services.

Col. Harvey Cushing, Medical Corps, was appointed June 7, 1918, Chief Consultant in Neurological Surgery, this, after a year with the British. Colonel Cushing brings out in his report that roughly 25 per cent of the casualties involved neurological problems. No separate branch of neurological surgery existed in either the French or British services. His plan was to have teams for this work in the Zone of the Advance, representatives in Base Hospitals and a Neurological Center. He says British experience indicated the value of operating on cranio-cerebral cases in the Zone of the Advance and that this reduced mortality to about 50 per cent. There was not enough work for the neurological surgeons assigned to the forward hospitals and it was found necessary to require them to act as general surgeons when not occupied with their specialty. A frequent result of this was their diversion to other work. Neurological surgeons in the Zone of the Advance often encountered administrative objection to long operations made necessary by great attention to detail and the use of local anesthesia. After the arrival from America of a list of medical officers with experience in nerve surgery, it was possible to assign a neurological team to nearly all evacuation and mobile surgical hospitals in time for the July offensive. A careful set of instructions was written for their operations. In the St. Mihiel campaign, although teams were present, many head cases went to the general teams, and the mortality was high. For the Argonne campaign, two teams were recommended for each of the hospitals likely to receive many head cases and instructions were given to route such cases accordingly. In the rush of battle, however, this was found to be impracticable, and a hospital for head cases only was finally established at Deux Nouds. Between September 29 and October 16, 813 cases were treated at this hospital, but there were many mistakes in routing, Colonel Cushing remarks, and secondary evacuation often delayed the cases ten or twelve hours. The location of Deux Mouds presented great difficulties in evacuation. During the later phases of the Argonne campaign certain beds were set aside at Souilly, Fleury and Villers-Daucourt, and sufficient special teams were assigned and routing orders given. The problem of the neurological surgeon is a special one because retention of the case in the hospital for ten to fourteen days after operation is necessary to avoid cerebral fungus; primary wound closure after debridement is the only safe procedure. In reviewing the work of the Section of Neurological Surgery during the war, Colonel Cushing states that for a battle line which is not moving, teams placed in neurological hospitals give the best results, but for a mobile line, teams should be placed in evacuation hospitals and there should be a neurological center at the base. Efforts were made to have a nucleus of neurological surgeons and neurologists at each center, and Base Hospital No. 115 was started as a special neurological hospital.

Major, later Lieut. Colonel, V. P. Blair, Medical Corps, arrived in France on April 18, 1918, with certain oral and plastic surgical units and was made senior consultant in Maxillo-Facial Surgery, a sub-section of the Surgical Service. The teams were sent to the French and English armies and gradually withdrawn in accordance with American needs. Some of the specialists were assigned to general surgical and dental work and were never returned to their section. Each base and evacuation hospital had one surgeon and one dental surgeon available for maxillo-facial work, but not all mobile surgical hospitals were so supplied. In his interesting final

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report, Colonel Blair recalls the fact that on August 7, 1918, the Chief Surgeon requested the assignment of consultants in the various specialties to the chief hospital centers and, to each convalescent camp also, a specialist on the heart and in orthopedic surgery. The Maxillo-Facial Surgical Section was able to make its assignments to each of these centers. Concentration of its cases in one hospital of a center was advised and the presence of representatives of the other branches at the great centers made it possible for the maxillo-facial surgeon to avail himself, when necessary, of the services of the otolaryngologist and the oculist; also a dental surgeon was always available to work with the maxillo-facial surgeon. In authorising the establishment of the maxillo-facial section the Chief Surgeon instructed that it be a part of the surgical service, but that it take advantage of coöperation with the dental service. Cooperation was carried out between the surgeons of the surgical, dental and maxillo-facial services. As in all other branches, supervision of cases from early to late was regarded as necessary. Colonel Blair gives as causes for failure in certain cases, the lack of beds, making evacuation to the United States necessary, lack of equipment, lack of official instructions, lack of dental surgeons in certain hospitals, notably mobile surgical hospitals, and the diversion of maxillo-facial surgeons to other work, the senior consultant and his assistant having spent a month away from the work of the section as members of an operating team. Colonel Blair made a recommendation in June, which appeared in the Chief Surgeon's Bulletin in October, as to a plan of treatment for maxillo-facial cases. He also made a recommendation in June as to what cases should be evacuated to the United States. This appeared also in the October issue, but before that time many improper cases had been evacuated. Base Hospital No. 115 at Vichy was blocked with general cases, and plans made by the maxillo-facial section could not be fully realized. A school for surgeons and visiting surgeons in oral and plastic surgery was established. Much work was done in selecting proper personnel and in developing maxillo-facial work at hospital centers and schemes for special operative work were thoroughly outlined. Colonel Blair felt that the aims of his section were carried out in large measures.

When Col. James T. McKernon, Medical Corps, became Senior Consultant of Ear, Nose and Throat Surgery, he found that the section of otolaryngology had one representative in each of seventeen base hospitals and that of fifty camp hospitals, about twenty-five of which were functioning, less than one-third had otolaryngologists. The total roster of his section numbered thirty-two. One-third of the base hospitals lacked sufficient instruments and equipment. In his final report Colonel McKernon outlines his work in preparing a supply table and in arranging for examination and treatment rooms, special nurses and equipment, for hospitals not having them. All camp hospitals were finally provided with specialists, instruments and rooms, as were all evacuation and mobile surgical hospitals. Combatant divisions filing requests for otolaryngologists could not be accommodated, because of an insufficiency of special officers. Consultants were assigned to hospital centers and concentration in one hospital of all the activities of the otolaryngologists was arranged. Circular No. 50 of the Chief Surgeon's Office outlined the care of the class of cases applying to this division, and its publication immediately diminished unnecessary operative work. The senior and other consultants were available upon request from the specialists at hospital centers. Severe cases were routed to Base Hospital No. 115 at Vichy, where there was a special staff. A working schedule for classification and standardization of ear cases was prepared, which tended to simplify the work of the Medical Department as well as that of the Disability Boards. To show the growth of his

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department, Colonel McKernon mentions that on December 18, 1918, there were 238 officers on duty and twelve held in reserve. On account of lack of sufficient work for otolaryngologists assigned to the evacuation, mobile and field hospitals, Colonel McKernon believes that only those competent to become members of surgical teams should be assigned to this part of the Zone of the Advance. In large centers consultants are essential. In addition to operative work, they should be utilized in instructing in modern methods of otolaryngological surgery. Colonel McKernon believes that one or more specialists of his section should be assigned to each combatant division to avoid the evacuation of minor cases.

Lieut. Col. Allen Greenwood, Medical Corps, was Chief Consultant in Ophthalmology. In his final report he recalls the difficulty which he encountered because base hospitals had small and inadequate equipment. He states that Base Hospital No. 36 at Vittell illustrated the advantage of having hospitals provided with an initial equipment. Colonel Greenwood visited all the hospitals and built up clinics or combined clinics in centers. Conferences were held at hospital centers and he found that these conferences and visits to the hospitals and consultants stimulated them to better work. A Base Optical Unit and eight auxiliary units were organized in the United States and arrived in France on May 4, 1918. As in so many cases the equipment and men were shipped separately and part of the equipment arrived in July and the rest in September. The delay in replacement of lenses was never made up fully. The repair shop was built in July but was not in full operation until October, 1918. The auxiliary units were sent out to various hospitals and an enormous number of prescriptions were filled in spite of the lack of equipment. The auxiliary units were in great demand and additional ones were formed from opticians found in the base optical shop, in base hospitals and in other already existing units. Colonel Greenwood believes that the formation of mobile units for the future would be worth while, but during the World War the armistice cut short his plan. Because of the disastrous mental effects noted among the blinded Canadian and Australian soldiers, the section in ophthalmology had much work in retraining the American blind before sending them back to the United States. Colonel Greenwood came to the conclusion, as a result of his experience, that base, evacuation and mobile surgical hospitals should have ophthalmologists, but that they were not necessary in combatant divisions, and he believes that the ophthalmologists assigned to evacuation and mobile surgical hospitals should be men competent to work on general operating teams. Refraction for combatant divisions should be done at evacuation hospitals. If the work for the ophthalmologist in a base hospital is light, ear, nose and throat work could be added to his task. Concentration of all of the clinics at hospital centers should be arranged. An eye hospital should be established to accomplish the proper routing of cases and should be used also as a center for instruction. Base Hospital No. 115, the hospital for head surgery, was designated for eye work also, but this occurred late in the campaign.

In the preceding paragraphs, the reports of the chiefs of the various branches have been abstracted. It is repeated that one must not permit his prejudices to obscure recognition of the magnitude of the work of the special divisions nor of the good they did. During the war, when the point of view was restricted, vision was short because of local conditions, and men ascribed all sorts of reasons for the difficulties arising with reference to the special services. One opinion often expressed was that the

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highly successful men who came into the army from civil life were, by reason of years of private practice, individualists, meaning that they were men who could work alone but were not adapted to teamwork. Another group thought that the Regular Army medical officer, usually found in responsible administrative positions, had been so narrowed by routine that he was unable to grasp the significance and the value of what the eminent practitioners of medicine from civil life were offering the Army. Much feeling was aroused among medical officers in general, and among the specialists, by the fact that the consultant was marked out in sharp relief against the drab background of the ordinary practitioner.

As was stated in the opening paragraph of this paper, the roots of the trouble lie deep in the organization of the Medical Department and of the Army. There were diverse elements which led to weakness in the organization of the professional services during the World War. At the very beginning the Army desired the help of members of the profession in civil life and found that years of isolation had so separated the military and civilian branches that there were tremendous difficulties connected with the mere listing and classifying of those who could offer valuable assistance. All sorts of medical men in civil life desired to help. The path of least resistance was chosen by many, and this was to accept a commission, go to school and enter the service as medical officers in regular course, but those doctors who had achieved eminence in the profession and had much of great value in special lines to offer found that there were no ways open, no channels of communication existed between the organized societies of medicine in civil life and the Surgeon General's office. The establishment of the medical sections of the Council of National Defense offered places for a few, and as the program of the special divisions in the offices of the Surgeon General and of the Chief Surgeon, A. E. F., slowly developed, other men found positions of usefulness. The Tables of Organization and the Manual for the Medical Department were silent so far as consultants were concerned, and no precedents or customs of the service helped to give either the specialists or the administrative officers of the Army light on the subject of the functions of these new elements in the medical service.

The Surgeon General is always busy, but never busier than in time of preparation for war. He is then overwhelmed by military affairs and the expanding relationships with civilian medical committees and societies. The need of organization of this latter part of his office was shown in the early phases of the World War. The Medical Corps of the Army had not specialized, as had the general profession. It was not well prepared to receive and apply specialism. Lists of personnel were

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lacking or defective, and square men were placed in round holes as a result; psychiatrists became ambulance company commanders, and great surgeons left their careers behind them and became administrators. Effective liaison between the Surgeon General and the organized profession in civil life is needed, not in preparation for war alone, but all the time. The appointment of an officer in the office of the Surgeon General to organize Civil Relationships is indicated.

The directorates of hygiene and pathology now established in the Medical Department of the British Army point the way for our own organization. As stated in the *Lancet* for May, 1919, the objects of the directorates in the British service are to utilize the benefits of new knowledge through close coöperation between those working inside and outside of the service. Initiation and control of research are sought, and it is believed that the establishment of the directorates will raise the standards and offer inducements for specialists. Advisory committees of both military and civilian persons have been named to aid the directorates. In our own service an abundance of material is offered by civilian members of the profession, and all that is necessary in order to utilize this wealth of material is to bring it together and apply it in orderly form.

Of course there is no reason for believing that the specialist is any more of an individualist than any other medical officer of the Army; also the medical officer of the Army is about as much of a specialist as any one of those belonging to the special services. Every medical officer taking part in the war, whether he was a specialist or not, was an American graduated from a medical school; he had practiced general medicine for a while, and, in the case of the consultant and the medical officer, especially of the Regular Army, had then begun to specialize. The post-graduate school of the army specialist was at Leavenworth, and he gained experience on the border and at the maneuver camps. He specialized in sanitation, the care and discipline of the soldier and, more particularly, in transportation, administration and the field tactics of the Medical Department. To a degree, it is true that every doctor is an individualist in that he is restricted by the limitations of his own brain and his own hands, and medicine is a profession which does not tend to bring about combinations and teamwork. The very best men in the profession in America offered their services for the war, and it is absurd to search except in the system itself for the cause of the weak organization and its poor application.

General Morrison, in his lecture to students at Leavenworth, used to say that when war began the time for preparation ceased. The truth of this assertion granted, it follows that a program to solve the riddle of the

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consultants must be sought now while no war threatens and while the men with recent experience still live. In outline, the scheme here presented consists of three main elements: the maintenance of a classified list of all medical men in the permanent and temporary military service; giving the regularly organized and recognized medical societies a representation in the formation of this list and in The Professional Services; organization of The Professional Services in all units from the Surgeon General's office down. Recognition of the services in the Tables of Organization and publication of their well-defined functions in the Manual for the Medical Department are essential. It is proposed that the organization be elastic, reduced to skeleton form in times of peace and brought to full strength in preparation for war.

During the expansion period preceding any war there is a time when the members of the profession in civil life manifest an enthusiastic interst in the medical affairs of the army; on the other hand, the Medical Department reciprocates by giving a heightened welcome to offers of civilian aid. Efforts to maintain, in peace time, this mutual interest which is vital to success in war but which tends to disappear in quiet intervals, have been made, as illustrated by the organization of the Reserve Corps. Great and powerful societies of medical men representing every phase of professional activity have grown up in America. Through state organizations, their committees, the medical press, and the influence of individual members, they sway medical thought, control professional publicity and come into intimate contact with political bodies, both civilian and military, including the Regular and National Armies, the Militia and the corresponding Reserve Corps. Undoubtedly the Surgeon General must give much to these societies and take more from them. The highest success of the Medical department demands the sympathy and support of the profession at large. It needs its political influence, its knowledge of personnel, its keen interest in progressive medicine; it can utilize to good effect all the civic relationships, the educational contacts and the publicity which the societies have to offer. Orderly coördination of these important Civil Relationships of the Surgeon General is manifestly a vital part of the plans for the future.

An essential feature of the program for the utilization of the medical resources of the country in time of war is the immediate establishment of a permanent division in the office of the Surgeon General, to be called The Professional Services. To escape confusion in nomenclature the term "division" should be avoided and this new section designated the Professional Services, with an Officer in Charge. In The Professional Services there should be the surgical section and the medical section, with sub-sections representing the so-called specialties. To

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make the organization elastic, all of the present sub-sections should be named and their functions outlined, but because of exigencies which may arise in the future, the way should not be closed for the establishment of new sub-sections. Twenty years ago there would have been no X-ray sub-section, for instance, and in the future there may be some now undreamed of specialty which it will be necessary to include in the list. The establishment of The Professional Services in the office of the Surgeon General would make possible the supervision of medical practice in all lesser units. The Medical Bulletin issued by the Chief Surgeon in France might well be continued, in enlarged form, by The Professional Services, and published for the entire Medical Department, active and reserve, giving end results, comparative statistics, and new procedure applicable in the army. The Professional Services would be coördinated with other branches of the Surgeon General's office exactly as are the other divisions, and in its necessarily close relations with the profession at large, the schools, the societies and journals, the liaison officer appointed for this purpose should play an important part. Civilian committees appointed by societies of medicine and surgery and of the specialties to work with the sections of The Professional Services should result from the activities of the liaison officer and be coördinated by him.

The list of professional personnel, in the beginning, should consist of all medical officers now in service, whether active or inactive. The Personnel Division of the Surgeon General's office offers the medium for its maintenance, and it is suggested that the personnel officer be in charge of the list and that he be aided by the following officers in the Surgeon General's office: The Officer in Charge of The Professional Services; the Liaison Officer in Charge of Civil Relationships; the officer in Charge of the Coördinating Division. This permanent body of officers should be brought into contact with the profession in civil life through the means of representative committees from the various societies. The functions of the various members in the preparation of the list are easy to see. The personnel officer in his relations to promotion and assignment, and with an already established office, would naturally assume the administrative part. The officer in charge of The Professional Services with its group of special sections would have large knowledge of qualifications and would aid greatly in classification and in the assignment of specialists. The desires of the societies representing the profession at large would find expression through the Liaison Officer, and the Coördinating Officer would represent the other branches of the Surgeon General's office. The primary classification of medical men now connected with the service should be completed as soon as possible and the rearrangement in rank of those in the Officers' Reserve Corps based on the classification.

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After this primary classification and rearrangement according to rank, all temporary officers should come in to the Reserve Corps as lieutenants. Based on the periodic findings of the body of officers having charge of the list and constituted as outlined above, a flow of promotion according to professional qualifications and military experience should be assured. A revision of the list, to take place at intervals of not more than three years and to be based on the findings of the permanent group of officers in charge of the list, would be required.

The establishment and maintenance of a properly classified list of medical men now in the military service is a task of large proportions and an exceedingly difficult and complicated one, particularly if the related subjects of rank and promotion are considered, but it is an essential element in preparedness for mobilization of the medical resources of the nation and must be accomplished. The maintenance of a list of medical men not in any branch of the military service, with our form of government, divided as it is into many states, would probably be impossible, but certainly the official list of those in the military service should be augmented so far as possible by others of men not in the military service having valuable qualifications to offer. The appointment of a liaison officer in the office of the Surgeon General to bring him into contact with the civilian profession would go a very long way toward making the larger list possible.

For all organizations of the Army, of which territorial departments, expeditionary forces, armies, army corps and divisions are examples, there should be established a branch of The Professional Services, to be a part of the office of the medical officer acting as chief surgeon of the organization. There is nothing incongruous about this organization, and when once established, it would be understood by all men with any military experience and would fall in line with accepted military custom as readily as did the establishment of a similar branch for sanitation. If a military organization such as an expedition or a district springs into existence through some military emergency, it is now taken for granted that a chief surgeon will be named and that a place will be made in his office for a sanitary inspector. In the future it should be just as well established that there will be an officer in charge of The Professional Services. The personnel of the sections and subsections may be fixed from time to time in accordance with the importance and size of the unit. It is quite conceivable, for instance that during a campaign in the tropics a sub-section for tropical diseases might become necessary and assume large importance, so that the one sub-section of tropical medicine might become paramount and exceed in its functions and personnel, say the section of surgery. It is also easy

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to see that in a small organization, while there might be on paper a place for The Professional Services, the work for them to perform would not be of sufficient importance to have even an officer in charge of the whole just as there might not be a sanitary inspector, the chief surgeon himself assuming the duties of the vacant offices. Nevertheless, the machinery would be in existence in case necessity required any one of the sections to come into activity.

If the officer appointed by the Surgeon General to take charge of Civil Relationships is possessed of large vision and organizing ability and constructive imagination, he will find himself in a position of great possibilities for useful service. There is no question but that the medical societies, the schools and the journals have always been keen in their enthusiasm in time of war. It will be for the Liaison Officer to keep the fires burning in peace times. He should be able to maintain the interest of the profession by means of many items of news value. The output of research, the laboratories, and hospitals of the service, as scientific contributions, can be given greater circulation if properly presented. The help of the Liaison Officer can be utilized through his contact with schools, the medical press and the societies in recruitment of the Medical Corps, and very extensively in enlarging the Reserve Corps and in preparing the way for expansion among those not willing to enter the Reserve Corps but who are ready to offer themselves in an emergency. In the formation of the committees named by the societies to collaborate with The Professional Services of the Surgeon General's office, the Liaison Officer may again be of great service by arranging for the appointment of men who are selected because of their fitness to immediately take charge of sections in case of war. Members of these special committees will probably often accept commissions in the Reserve Corps because of the interest in the service which they have already manifested by joining the committees. The office files of the Liaison Officer should be crowded with classified information gathered from civilian sources and placed at the disposal of the other branches of the Surgeon General's office. These will doubtless consist largely of lists of names of men with special qualifications which, kept up to date, will become invaluable on the threat of war. The play of relations between The Professional Services and the corresponding committees representing the profession offers a field of great activity for the Liaison Officer. It is not intended that the relations of any office or branch of the Surgeon General's office with members or organizations of the profession in civil life shall be limited in the least by the establishment of a liaison office, but rather that they shall be developed and facilitated by increasing the opportunities and by systematizing the channels of communication.

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The organization of The Professional Services in all units as a recognized and permanent part of the medical system will prove to be a stimulus to medical officers to specialize along professional lines. In civil life men strive for the prizes of increased income, greater power and social prestige. In the army, with promotion by seniority, fixed salaries and settled social position, officers strive for the assignments regarded as prizes and, in the Medical Department of the past, these have been largely administrative places. The Professional Services will open the way for high assignment along their chosen lines to a considerable number of army medical specialists.

The advantage to the service in time of expansion of having civilian committees in touch with The Professional Services must not be forgotten. Just at present there are many medical men with military experience, but as the years pass the societies will name junior members to the committees whose only contact with the army and whose best opportunity for gaining knowledge of military affairs will be through membership in these committees. If commissioned in the Officers' Reserve Corps, as it is expected they will largely be, they will progress in rank according to professional fitness and military experience and become more and more eligible for transfer in case of war to an active place in The Professional Services. It is supposed that future wars will demand, as past ones always have, the assignment of the medical officers of the Regular Army to administrative positions, leaving The Professional Services vacant for the reception of qualified men from civil life.

The Professional Services and the corresponding committees from civil life must be so organized as to be elastic. Chart I, accompanying this paper, is intended to show the relation of the services within and without the confines of the office of the Surgeon General. It will be noted that sections are left blank to indicate room for expansion as new specialties develop. Contraction, to do away with unnecessary or inactive sections, is equally feasible. The Sub-Section of Research is placed, in accordance with Colonel Crile's excellent suggestion, under the Officer in Charge of The Professional Services, equally associated with the Sections of Medicine and Surgery, and with direct coördination with the Division of Hospitals and of Laboratories. As with all the other sections and sub-sections, there will be a corresponding civil committee for the Research Sub-Section.

The Professional Services must be elastic in personnel as well as in function. In time of peace it is not to be supposed that medical officers of the Regular Army can be spared in sufficient numbers to fill even the various sub-sections of the service assigned to the office of the Surgeon

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General and much less so to lesser organizations. For periods of inactivity it would probably suffice to have officers on duty with the Surgeon General's office in charge of the service as a whole, of the Sections of Medicine and Surgery and perhaps in the Sub-Section of Skin and

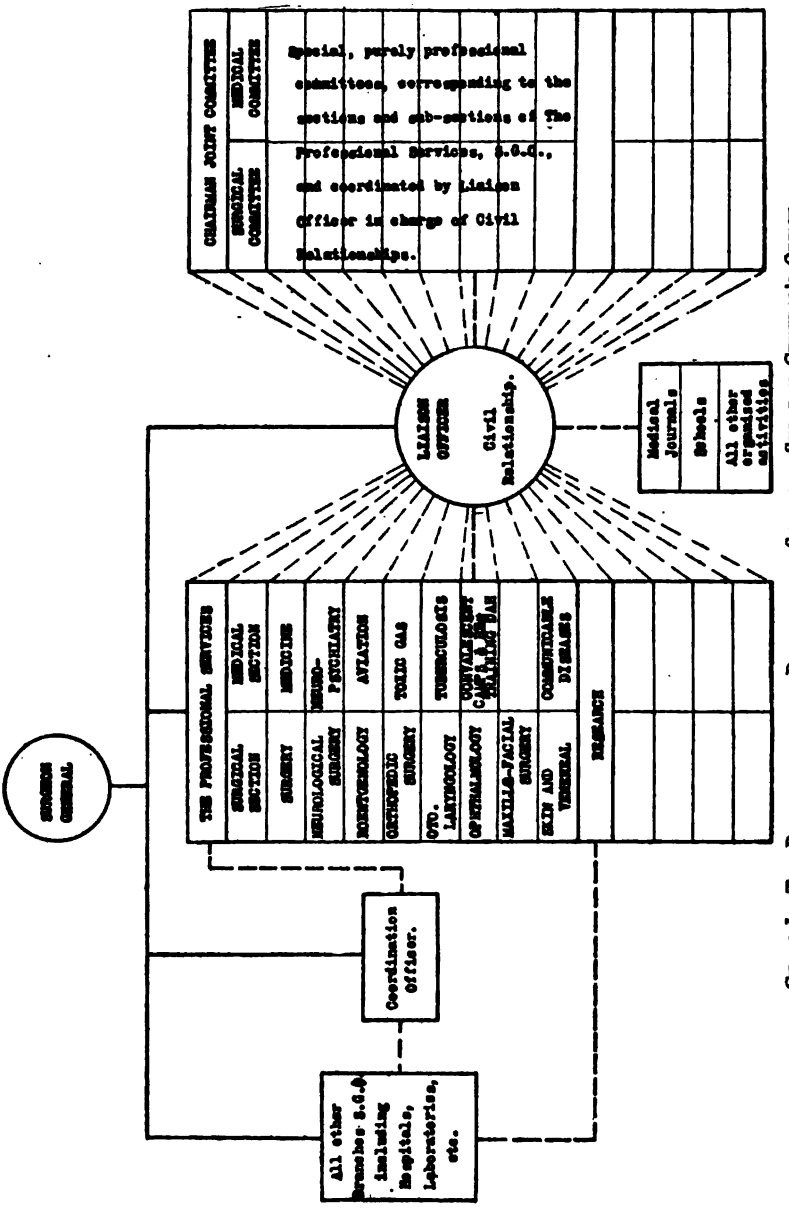

CHART I.—THE RELATIONS OF THE PROFESSIONAL SERVICES, SURGEON GENERAL'S OFFICE.

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Venereal Disease and Research. In case of expansion for an expeditionary force, the size of the force, the geographic location of the struggle, and many other conditions would enter into the determination of the personnel of The Professional Services. Combination of various sections is practicable, as, for instance, those of Communicable Diseases and Tuberculosis or Otolaryngology, Ophthalmology and Maxillo-Facial Surgery. The experience of the World War proved that specialists must be men of broad, basic training; the orthopedist and the neurological surgeon must also be general surgeons if occasion demands; the officer who aspires to become head of a Section or of The Professional Services should be a man of many sympathies, but it will not be to his disadvantage to have had great experience in one branch. While it is not intended to place administrative duties upon members of The Professional Services, they must be men of sufficient experience to appreciate the necessity for organization and be ready to work as harmonious elements of the army.

In the lesser organizations of the Army, including departments, districts, expeditionary forces, armies, corps and divisions, it seems good organization to apply exactly the same system as is maintained in the office of the Surgeon General, but to fill the sections and sub-sections with only the necessary personnel. Thus an expeditionary force in a World War will have every place filled, with an officer in charge of each sub-section, and with junior officers in the active branches as assistants. Departments are territorial organizations; some are active and others are not; in active departments certain sections will need to be provided with personnel, in others the Department Surgeon will not require such assistance. An army of occupation requires an officer in charge of the Sections of Medicine and Surgery but not much else, while an army occupying an active sector should have the sections pretty fully manned. A corps never needs more than the officers in the Sections of Medicine and Surgery. These can efficiently supervise and coördinate the work of the specialists in the divisions and apply the advice of those in the Army. Also they can keep in touch with the officers of The Professional Services in the mobile, surgical and evacuation hospitals no matter in what administrative zones these institutions are placed by the Tables of Organization of the future.

The division probably offers the hardest riddle of all the units. The three special branches of orthopedic surgery, skin and venereal disease and psychiatry were usefully represented in the divisions during the World War. They must be present in some form in the future The psychiatrist was not very busy, but his work was highly specialized and his presence was well worth while; the orthopedic surgeon was

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wonderfully useful in the early phases of the war, but after the defectives were eliminated he became largely a "splint-man"; the skin and venereal specialist was very useful while camps for venereals were in function

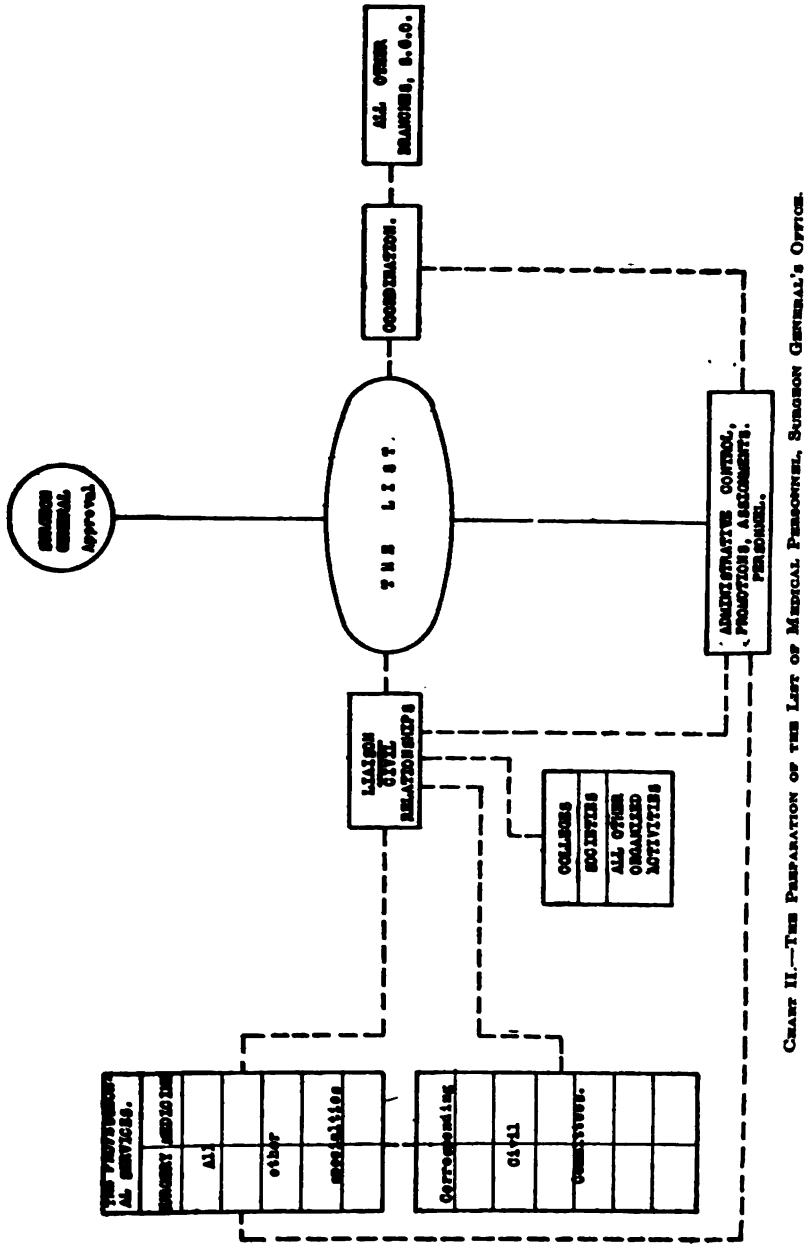

CHART II.—THE PREPARATION OF THE LIST OF MEDICAL PERSONNEL, SURGEON GENERAL'S OFFICE.

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but an administrative officer generally took over the louse and scabies problems because of the necessity of coördinating delousing, laundering, salvage and re-clothing. There must be no doubt about the definition of the functions of specialists assigned to divisions nor about their recognition in Tables of Organization. It seems clear that wherever they come from they must be a part of the office of the division surgeon. Every effort at other dispositions failed wholly or in part. The authorities object seriously to encumbering division headquarters with unnecessary personnel, and since this is based on well-recognized military necessity, thorough consideration must be given to the question of reducing the number of medical officers to the minimum. In this consideration, however, it must not be forgotten that the division is the chief place of contact between the soldier and The Professional Services. The much emphasized continuity of treatment begins in the division and ends in home territory. Preventive medicine exercises much of its beneficence in the division. With reluctance at giving up the orthopedist, the urologist, and the psychiatrist, I have adopted in this paper the plan of having only two representatives of The Professional Services assigned to divisions in the Zone of the Advance.

These two representatives are officers in charge of the Sections of Medicine and Surgery. The representative in medicine should be chosen with the acquiescence of the head of the Sub-Section of Psychiatry and the officer put in charge of surgery should be assigned after consultation with the heads in Orthopedic Surgery and Skin and Venereal Diseases. Over and over again the final reports called attention to the necessity for having broad, thoroughly grounded men in the special services of the divisions. General surgeons of this sort, properly advised by the specialists in the higher units, can be of great value to the division surgeons in handling the professional work associated with the wounded, and they can satisfactorily pass on the special problems of orthopedic surgery and venereal prophylaxis; the same is true regarding the internist and psychiatry. With a skeleton organization, alike for The Professional Services in all units, it will be practicable to assign representatives of any of the sections for temporary duty in divisions, if local difficulties arise; certainly this will be wise in the case of new divisions and of those located in rear areas.

During the World War, medical organization in the Service of Supply was better prepared than in the Zone of the Advance to receive the specialists. Administrative and professional considerations were not so intimately mixed. The associations were more nearly like those of civil life; control by higher medical authority was closer and more purely professional. The great hospital centers will require a nearly

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full group of consultants, but concentration of special patients of one class at a single hospital will make it possible to avoid excessive personnel. In the case of hospitals given up entirely to special cases the

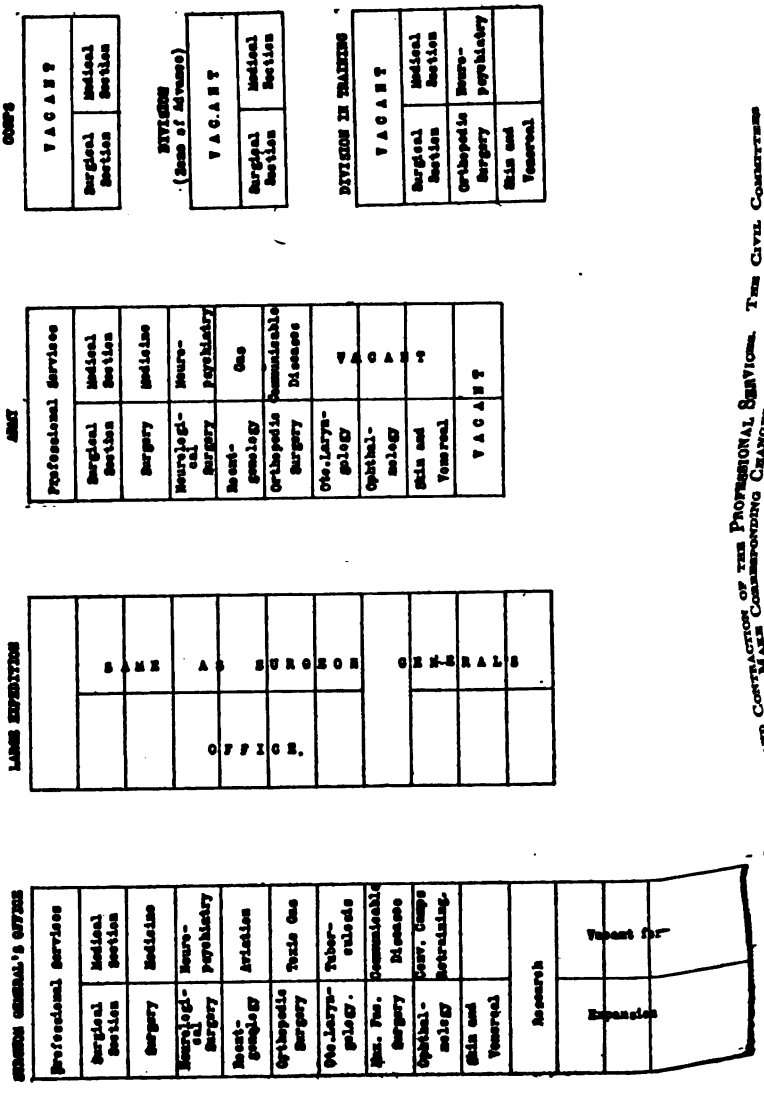

CHART III.—EXPANSION AND CONTRACTION OF THE PROFESSIONAL SERVICE. THE CIVIL COMMITTEES MAKE CORRESPONDING CHANGES.

plan outlined by Dr. Arthur D. Bevan, of Chicago, in THE MILITARY SURGEON for August, 1919, may well be applied. His idea is to have special hospitals manned by specialists of the branch concerned, the general surgeon or the internist to be called in when necessary. To

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mould his plan with that here outlined will not be difficult. All that is necessary is to fill the sub-section corresponding to the class of cases received and leave vacant the Senior Sections of Medicine and Surgery. For instance, in a hospital for eye cases, the Sub-Section of Ophthalmology would have an officer in charge, while the Section of Surgery would not be represented except, perhaps, by an officer of the Sub-Section of Surgery and junior to the ophthalmologist.

During the early phases of the development and maintenance of the Classified List already mentioned, many difficulties will be encountered. So far as the Regular Army is concerned, they may be overcome by progression along established lines. There are already lists, undoubtedly classified, perhaps not in black and white, but certainly in the minds of those who control the destinies of individual medical officers. A revision of the list of subjects for entrance and promotion examinations can be made at any time, under existing orders, to afford any necessary data in regard to the special qualifications of members of the Medical Corps. Also officers are being given increased opportunities in the military hospitals for showing what they can do. The efficiency reports give information as to what lines officers have followed and the relative success of their efforts. Assignments can readily be made in accordance with the classification whether or not promotion by selection is adopted for the service. Temporary officers on active duty would be listed and classified exactly as are regular officers.

For the present members of the Reserve Corps, surely the difficulties of classification are not insurmountable. Age, position in civil life, length and relative success of military experience and acceptable performance of duties in positions of responsibility are probably the chief elements in the primary classification to determine rank and skeleton assignment. After a certain time no one should be admitted except through the lowest grade and on recommendation of the board having charge of the Classified List. Promotion must be by selection and in accordance with carefully prepared regulations. It will probably be slow in time of peace and rapid in case of expansion. If the board is constituted as outlined in earlier paragraphs, giving full representation to the profession in civil life, its periodic findings will probably be more acceptable to medical men generally than have the methods of the past. The board should be controlled by regulations known to all concerned and fair to all, but full elasticity should be preserved to allow for emergency expansion and for exceptional cases of advancement in rank or change in assignment to meet the interests of the service. A study of Chart II will show that while ample coördination is provided for the organized profession in civil life and The Professional Services and other

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PEACE

SURGEON GENERAL'S OFFICE

Professional Services	
Surgical Section	Medical Section
Research	
VACANT	VACANT

DEPARTMENT

Professional Services	
VACANT	

EMERGENCY DISTRICT

VACANT	
Surgical Section	Medical Section
Orthopedic Surgery	Communicable Diseases
Skin and Venereal	
VACANT	

SMALL EXPEDITION TROPICS

Professional Services	
Surgical Section	Medical Section
Orthopedic Surgery	Neuro-psychiatry
Skin and Venereal	Aviation
	Tropical Medicine
Research	

CHART III-A.—EXPANSION AND CONTRACTION OF THE PROFESSIONAL SERVICES. THE CIVIL COMMITTEES MAKE CORRESPONDING CHANGES.

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branches of the Surgeon General's office, nevertheless final approval and therefore control is preserved for the Surgeon General himself. A system of examinations will doubtless be established by the board, but the findings should be based not on the results of the examination alone, but also on the opinions of the four members of the board, representative as they are of powerful groups in the profession in both civil and military life.

If the militia system continues to be a part of the scheme of national defense and militia medical officers are called into federal service, they should be listed and classified, and assigned according to classification. It is impossible with our present laws for the Medical Department to escape any more fully than other branches of the Army the complications arising from the inherent weaknesses of the militia system.

After the Classified List is perfected, after The Professional Services are fully organized, even after the Reserve Corps becomes popular, there will be a considerable number of medical men untouched by military enthusiasm. Unfortunately for the army, in this number will be many of the most successful men in civil life, men who have much of which the Medical Department is in great need, particularly in time of war. They are the men who have one-way minds, whose devotion to a single subject leads to eminence but does not permit of alienation from their chosen career. In part, these useful men will take places on the civilian committees representing their specialties in coördination with The Professional Services. They will not accept commissions in the Reserve Corps in times of peace, but they will form a reserve supply of specialists willing to serve in case of a great war. This reserve will be readily available only in case the Auxiliary List of medical men not in service is organized. The formation of the subordinate list which goes to make up the Auxiliary List should be one of the chief responsibilities of the liaison officer in charge of Civil Relationships. The Auxiliary List may well contain the names also of eminent men, beyond military age, who are serving on committees, and who could be commissioned in times of great expansion to take quiet places in The Professional Services made vacant by demands from the front for all officers of military age.

The moment the question of the list arises with its dependent conditions of promotion and assignment and, most important of all, the project of admitting members of the Reserve Corps only in the grade of lieutenant, there will be protests. The objection will be that many very useful men will not come into the Reserve Corps in peace times and that when the necessities of war make it mandatory to employ them, it is embarrassing to both the Government and the medical men concerned to offer them commissions in the grade of lieutenant. Will not the

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development of the Classified List, close liaison with the profession at large, the assurance of a steady flow of promotion in the Reserve Corps, the coördination of civilian committees with The Professional Services

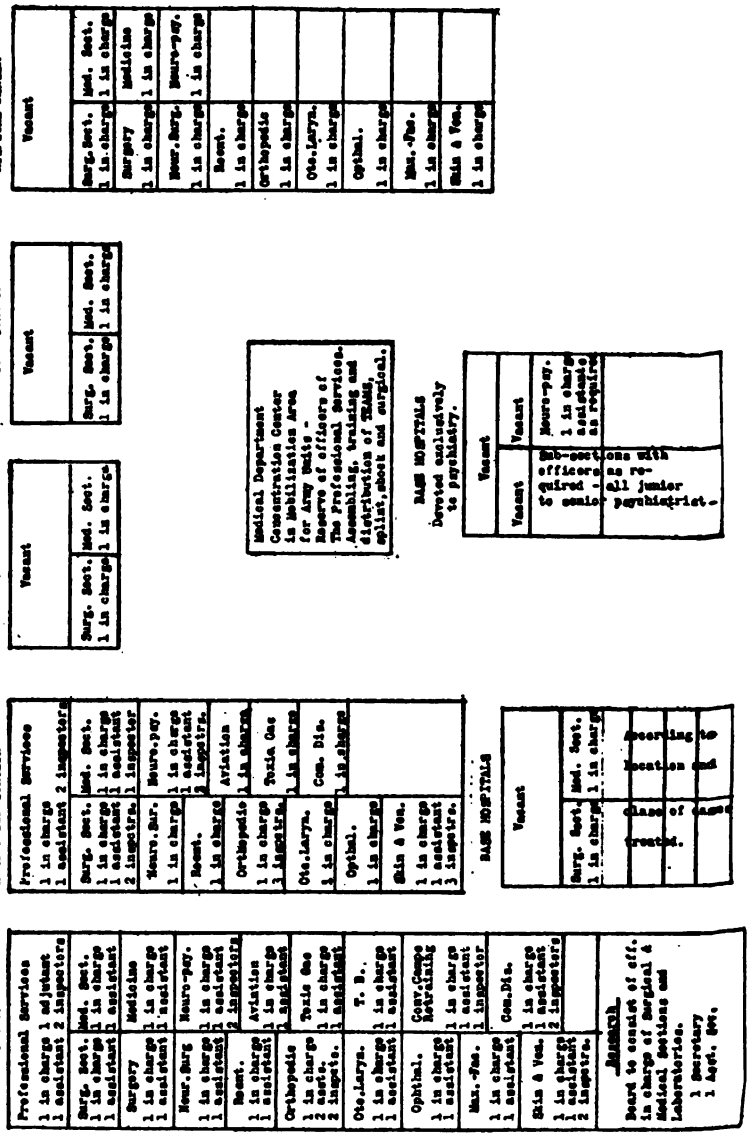
CHIEF SURGEON
Professional Services
1 in charge 1 adjutant 2 inspectors
Surg. Sect. 1 in charge 1 assistant
Med. Sect. 1 in charge 1 assistant 1 inspector
Surgery 1 in charge 1 assistant
Neuro.Sur. 1 in charge 1 assistant
Neuro-psy. 1 in charge 1 assistant 1 inspector
Roent. 1 in charge 1 assistant
Orthopedic 1 in charge 2 asst. 2 inspts.
Oto.Laryn. 1 in charge 1 assistant
Ophthal. 1 in charge 1 assistant
Gen.Dis. 1 in charge 1 assistant 1 inspector
Skin & Ven. 1 in charge 1 assistant 2 inspectors
Board to consist of off. in charge of Surgical & Medical Sections and Laboratories. 1 Secretary 1 Asst. Sec.
ARMY CORPS SURGEON
Professional Services
1 in charge 1 assistant 2 inspectors
Surg. Sect. 1 in charge 1 assistant 2 inspctrs.
Med. Sect. 1 in charge 1 assistant 1 inspector
Neuro.psy. 1 in charge 1 assistant 3 inspctrs.
Aviation 1 in charge 1 assistant
Orthopedic 1 in charge 1 assistant 1 inspctr.
Train Gas 1 in charge 1 assistant
Gen. Dis. 1 in charge 1 assistant
Ophthal. 1 in charge
Skin & Ven. 1 in charge 1 assistant 3 inspctr.
BASE HOSPITALS
Vacant
Surg. Sect. 1 in charge
Med. Sect. 1 in charge
According to location and class of cases treated.
CORPS SURGEON
Vacant
Surg. Sect. 1 in charge
Med. Sect. 1 in charge
DIVISION SURGEON
Vacant
Surg. Sect. 1 in charge
Med. Sect. 1 in charge
Medical Department Concentration Center in Mobilization Area for Army Base - Reserve of officers of The Professional Services. Assembling, training and distribution of Units, split, short and surgical.
BASE HOSPITALS
Devoted exclusively to psychiatry.
Vacant
Vacant
Neuro-psy. 1 in charge 1 assistant 4 inspctrs.
Sub-sections with officers as required - all junior to senior psychiatrist.
HOSPITAL CENTER
Vacant
Surg. Sect. 1 in charge
Med. Sect. 1 in charge
Surgery 1 in charge
Medicine 1 in charge
Neur. Surg. 1 in charge
Neuro-psy. 1 in charge
Roent. 1 in charge
Orthopedic 1 in charge
Oto.Laryn. 1 in charge
Ophthal. 1 in charge
Ms.-Ven. 1 in charge
Skin & Ven. 2 in charge

CHART IV.—INDICATING TABLES OF ORGANIZATION FOR PROFESSIONAL SERVICES OF AN EXPEDITIONARY FORCE IN A WORLD WAR.

nearly clear away the objection? Immediate classification of the present Reserve Corps officers and appropriate rank for those deserving it will solve the difficulty for the present. As to the future, the board in charge

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of the Classified List should have power to recommend higher rank than lieutenant for men possessing qualifications of such exceptional kind that their services are necessary in an emergency, or at least to pass them rapidly through the grades. The time has come, though, when it is well to state the general conviction, gained in France, that the Medical Department usually can dispense with the services of the surgeon of eminent name, of middle age, of fixed habits of thought who demands high rank but who does not know that a sanitary train is not pulled by a locomotive, nor any other of the intricacies of military organization. Unless the enthusiasms of his youth have led him to the acquirement of the rudiments of military knowledge, he had better stay at home, when he arrives at maturity, and perform a useful service on a civilian committee, or accept the usual grade and gain promotion promptly by demonstrating unusually useful qualities.

A moment devoted to reviewing the application of the system advocated in this paper to the career of a typical individual or two may serve to stimulate the imagination and lead to a clearer visualization of the plan. Take first a medical officer of the Regular Army who has made his mark and received good training in surgery at school. He has had his tour with troops and the Classified List has indicated the advisability of assigning him to The Professional Services, this because of good surgical work performed and his high grade in a promotion examination. As a captain he has occupied a junior place in the Sub-Section of Surgery at a general hospital. Here one of his papers on a research problem has attracted attention. On reaching the time for promotion to a majority he has announced his desire to specialize and has been successful in the examination. After a year in charge of the Sub-Section of Surgery in the Surgeon General's office he has been placed at the head of The Professional Services of a district formed to meet an emergency. His years have given him both administrative and professional experience. He knows the problems of the Army and of the specialists. There has been time for a short course at Leavenworth and some attendance at clinics in the larger cities. The Surgeon General has placed him in charge of the Surgical Section (not sub-section) in Washington. He is here in intimate touch with the corresponding committee from the great Society of Surgeons. War comes and he is needed in an administrative position and leaves for the theater of operations.

The Classified List and the good offices of Civil Relationships aid the Surgeon General in the selection of a successor. Two men, both members of the civil committee on surgery, have been considered. One is chairman of the committee, of advanced middle age, a pro-

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fessor, prominent in professional circles; his outstanding qualifications are his broad knowledge of surgery and his great acquaintance with surgeons. The other is of almost equal prominence; he is younger; he has not had the same opportunities for widening his circle of acquaintances. In his youth he has been a member of an operating team in war time; he has been in the Reserve Corps ever since and has attained the high peace-time rank of major; he has been called into active service for a short period for the purpose of taking the special course in military surgery. The liaison officer has reason to believe the elder man will soon be chosen chairman of the Joint Professional Committees and that he will be of immense use in this capacity. The younger man is chosen and called to active service.

The program of organization for the special services presented in this paper is not the product of any one man; it is rather a statement of what the World War taught the service regarding the development of the medical resources of the nation. There was an insistent demand for accurate information regarding personnel; therefore let us establish the Classified List and at the same time increase the Reserve Corps by assuring a steady flow of promotion in peace times. There was ineffective application of the services of valuable men, because the Tables of Organization and the Manual did not define their places and functions and because of initial lack of coördination; therefore let us at once enlarge the Tables and Manuals and inaugurate The Professional Services. Finally, through the efforts of an active liaison officer in Civil Relationships, it will be possible to have an organized profession in support of the Medical Department, as the nation in time of need is always back of the Army.

NOTE: I acknowledge my indebtedness for helpful suggestions to many officers, chief of whom are Col. Joel E. Goldthwait, lately Chief Consultant, Division of Orthopedic Surgery; Col. S. H. Wadhams, Medical Corps; and Col. W. L. Keller, Medical Corps.

APPENDIX I

HEADQUARTERS
AMERICAN EXPEDITIONARY FORCES
OFFICE OF THE CHIEF SURGEON

FRANCE, *November* 9, 1917.

Circular No. 2:

1. The War Department has approved the plan of the Surgeon General's office, creating professional divisions in his office with a director at the head of each division in the United States, and a Director for each division with the American Expeditionary Forces. These divisions are:

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1. Division of General Medicine.
2. Division of General Surgery.
3. Division of Orthopedic Surgery.
4. Division of Surgery of the Head.
5. Division of Venereal, Skin and G. U. (Urology).
6. Division of Laboratories.
7. Division of Psychiatry.
8. Division of Roentgenology.

2. For the Expeditionary Forces, Major John M. T. Finney, M. R. C., has been designated as Director of General Surgery; Major Joel E. Goldthwait, M. R. C., as Director of Orthopedic Surgery; Major Hugh H. Young, M. R. C., as Director of Urology; and Lieut. Colonel Joseph F. Siler, M. C., as Director of Laboratories. The mes of officers designated for the remaining divisions will be announced later.

Additional officers will be named from time to time as Assistant Directors and Consultants for Corps, Sections of the Lines of Communication, large hospital centers and other areas.

3. The professional authority of Directors, Assistant Directors, and Consultants, within their respective divisions, will be recognized by all concerned and duly respected and observed, it being fully understood that this authority does not in any way include administrative control.

4. The Directors, each for his particular division, will be immediately responsible. to the Chief Surgeon, A. E. F., for the work performed in these various divisions. In general, they will direct and coördinate the professional services of all sanitary formations and hospitals so that there will be a continuity of treatment along the lines of recognized approved practice, from the front to the rear, in each professional division

They will also act as consultants and advisers, and when necessary in the interest of the service, they will change professional procedure or inaugurate new methods.

5. In order to carry out these plans, the professional service of Base Hospitals and General Hospitals, and other Hospitals as far as practicable, will hereafter be subdivided into eight sections as follows:

1. Section of General Medicine.
2. Section of General Surgery.
3. Section of Orthopedic Surgery.
4. Section of Surgery of the Head.
5. Section of Venereal, Skin and G. U. (Urology).
6. Section of Laboratories.
7. Section of Psychiatry.
8. Section of Roentgenology.

The Commanding Officer of each Hospital will organize his hospital as indicated, assigning a suitable officer to duty in charge of each section as far as it may be practicable. In making these assignments the professional qualifications of an individual in a particular specialty will receive due consideration. The chiefs of sections will report to the Commanding Officer, to whom they will be responsible, each for the satisfactory operation of his particular section.

A. E. Bradley, *Brig. Gen., N. A.,*
Chief Surgeon.

Approved:
By Command of General Pershing:
J. G. Harbord,
Chief of Staff.

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APPENDIX II

AMERICAN EXPEDITIONARY FORCES

Circular No. 25:

ORGANIZATION OF PROFESSIONAL SERVICES MEDICAL DEPARTMENT, A. E. F.

There has been appointed by G. O. 88, G. H. Q., A. E. F., June 6, 1918, for the Medical Department:

A Director of Professional Services, A. E. F.

A Chief Consultant, Surgical Service, A. E. F.

A Chief Consultant, Medical Service, A. E. F.

Senior Consultants in Special Subdivisions of Surgery and Medicine, Division Specialists, and Consultants for Base Hospital Centers and other Formations.

In order to utilize the professional services of the Specialists of the Medical Department, A. E. F., in a manner which will best facilitate complete coördination between forces from front to rear, the following instructions are issued:

Director of Professional Services.—The Director of Professional Services, under the Hospitalization Division of the Office of the Chief Surgeon, will supervise the professional activities of the Medical Department, A. E. F., and coördinate the work of the Consultants and Specialists of the Medical Department.

Chief Consultants.—The Chief Consultants, Surgical Service, will supervise the professional surgical subdivisions in the A. E. F. He will organize and coördinate these divisions in a manner which will permit him to anticipate, as far as possible, necessary changes in personnel so that timely requests for such changes may be made. He is responsible for the proper formations of the surgical teams in the A. E. F. and those attached to the units of the Allies, and he will keep lists and records of the teams whereby the amount and the efficiency of their work may be checked. For this purpose, he will require from each surgical team suitable monthly reports of the number of operations performed and the results obtained. He will make such recommendations as he may deem necessary for inspections as to technical procedure and instruction, details of operating surgeons, details to surgical teams, and appointment of Surgical Consultants in the A. E. F.

The Chief Consultant, Medical Service, will supervise all medical subdivisions in the A. E. F., and will make such recommendations as may be necessary to insure a high professional standard and complete harmony among his assistants functioning in all formations.

Senior Consultants.—Under supervision of the Director of Professional Services and the Chief Consultant in surgery and in medicine, Senior Consultants of the special subdivisions of medicine and surgery will coördinate professional activities relating to their specialties.

They will make necessary recommendations to the Chief Consultant as are deemed necessary for the instruction of consultants and specialists in divisional and other army formations. in order that prompt execution of directions relative to professional subjects may be assured.

Senior Division Consultants.—One Senior Medical and one Senior Surgical Consultant will be assigned to all tactical organizations which are the equivalent of one army corps, and consultants will be appointed in such numbers as may be necessary to assist the Senior Division Consultants. Senior Division Consultants will hereafter be responsible for the duties now being performed by the Division Consultants.

The Senior Divisional Surgical Consultant, under the Chief Surgical Consultant, A. E. F., will be expected to make at frequent intervals a complete survey of the

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professional instruction, surgical technique, and the methods of treatment in use in the division, and he will render from time to time such reports and recommendations to the Chief Surgical Consultant, A. E. F., as will promote a free interchange of suggestions and the most effective coördination with the other professional services.

He will supervise the professional activities of all consultants, operating teams, and operating surgeons attached to his division, in a manner which will permit him to familiarize himself with the individual capabilities of the men, with a view to selection, based on observation, of those likely to adapt themselves to modern military surgical team formations, rather than individual work.

He will be responsible for the organization, efficiency and distribution of surgical teams, and he will make such recommendations to the Chief Surgical Consultant, A. E. F., as will facilitate the formation of sufficient teams to meet the constantly increasing demands incident to the arrival in France of new formations.

The Senior Divisional Consultant will also coördinate the activities of the professional personnel in his divisions in a manner that will be conducive to high surgical standards, and elimination or reassignment to other duties of those who fall below the requirements. He will spare no effort to promote professional harmony and unity of treatment in the divisional formations.

Senior Divisional Medical Consultants.—The Senior Divisional Medical Consultant will, by frequent inspections, satisfy himself that the various classes of patients suffering from medical disabilities are receiving the best and most advanced treatment possible. He will report from time to time to the Chief Medical Consultant, A. E. F., the results of his inspections, and make suggestions looking toward the perfection of the Medical Services of the A. E. F.

Divisional Surgical Consultants.—The Divisional Surgical Consultant will, under the Senior Divisional Surgical Consultant, supervise the immediate surgical activities of operating teams within his division. During mobile or semi-mobile warfare, when established evacuation hospitals are absent, the operative work, in formations for non-transportable cases, will be handled, when practicable, by surgical teams functioning under the supervision of the Senior Divisional Surgical Consultant, or his assistant.

Divisional Medical Consultants.—Divisional Medical Consultants will supervise the immediate medical activities in the division to which they may be assigned.

Relation of the Division Surgeon to Senior Division Surgical Consultants and Consultants Functioning with Divisions.—The many details of organization and administration which will devolve upon the Division Surgeon, in the care of sick and wounded and their evacuation, will so tax his time and ability that it is not believed that the supervision of the technical surgical work, which at times must be done in divisional formations, should be added to his already serious responsibilities; therefore, the directions and supervision of the purely operative side of the work done in divisional formations is placed upon the Senior Divisional Surgical Consultant, or his assistants.

The Division Surgeon will supply the necessary hospital facilities, supplies, and personnel other than those forming teams. He will spare no effort in technical coöperation which may promote harmony of action between the professional services with the fighting forces, from the front to the rear.

Division Specialists.—One Orthopedic Surgeon, one Urologist, and one Neuropsychiatrist will be appointed from the division sanitary personnel, and, under the direction of the divisional Chief Surgeon, they will perform the duties pertaining to their several specialties, in addition to the other duties of medical officers which may be required of them by the exigencies of the service.

Consultants for Base Hospital Centers.—Upon the recommendation of the Chief

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Surgical and Medical Consultants, A. E. F., there will be appointed for Base Hospital Groups such consultants as may be necessary from time to time. These consultants will at all times be within reach of the Base Hospital Group to which they are attached.

The organization of Base and General Hospitals and other hospitals, as far as practicable, will be made on the bases of three services: Surgical, Medical and Laboratory, each composed of sections coördinated through a Chief of Service designated by the Commanding Officer, who may be selected from any section, ability and experience being the determining factors. In detail, the professiona services of hospitals are divided according to the following:

Organization of Base and General Hospitals

Surgical Services:

Chief of Service—
- 1st Section—General Surgery. { General. / Chest. / Abdomen. / Fractures.
- 2d Section—Orthopedic Surgery.
- 3d Section—Urology.
- 4th Section—Head Surgery. { Brain (also Neurological). / Ear, Nose and Throat. / Eye. / Oral (Face and Mouth).
- 5th Section—Roentgenology.
- 6th Section—Dentistry.

Medical Service:

Chief of Service—
- 1st Section—General Medicine.
- 2d Section—Neurology.
- 3d Section—Psychiatry.

Laboratory Service:

Chief of Service—
- 1st Section—Pathology.
- 2d Section—Bacteriology and Serology.

Circular No. 2 of this office, November 9, 1917, is hereby revoked.

M. W. IRELAND,
Brig. Gen. N. A., C. S.

A. E. F.

DIRECTOR PROFESSIONAL SERVICES
CHIEF CONSULTANT, SURGICAL SERVICE
CHIEF CONSULTANT, MEDICAL SERVICE

Army

Senior Consultant, Surgery, A. E. F.
1. General Surgery.
1. Orthopedic Surgery.
1. Urology and Dermatology.
1. Eye.

Senior Consultant, Medicine, A. E. F.
1. General Medicine.
1. Neuro-psychiatry.
1. Formations, equivalent to an Army Corps.

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Senior Consultant, Surgery, A. E. F.

1. Ear, Nose and Throat.
1. Neurological Surgery.
1. Maxillo-facial Surgery.
1. Roentgenology.
1. Research.
1. Formations, equivalent to an Army Corps.
4. Consultants (Assistants to division senior consultants).

Senior Consultant, Medicine, A. E. F.

2. Consultants (Assistants to division senior consultants).
(Others as required.)

(Army Corps)

DIVISION

SPECIALIST: EACH TACTICAL DIVISION

(A part of division sanitary personnel, Tables of Organization)

Surgery

1. Orthopedic Surgery.
1. Urology.

Medicine

1. Neuro-psychiatrist.

HOSPITAL CENTERS

Consultants, Medicine

Each Hospital Center, S. O. S.:

1. General Medicine.
1. Neuro-psychiatry.
(Others as required.)

Consultants, Surgery

Each Hospital Center, S. O. S.:

1. General Surgery.
1. Orthopedic Surgery.
1. Urology and Dermatology.
1. Eye.
1. Neurological Surgery.
1. Ear, Nose and Throat.
1. Maxillo-facial Surgery.
1. Roentgenology.

S. O. S.

SPECIALIST: EACH BASE HOSPITAL

(Part of unit Personnel)

Surgery (as needed)

General Surgery.
Orthopedic Surgery.
Urology and Dermatology.
Neurological Surgery.
Eye.
Ear, Nose and Throat.
Roentgenology.
Maxillo-facial Surgery.

Medicine (as needed)

General Medicine.
Psychiatry.
(Others as required.)

Original Set of Instruments Supplied to all Operating Teams

General operating case	1 (Par. 916 Med. Manual).	
Hemostatic forceps	24 No. 116 and 118.	
Hemostatic forceps, Kocher	12 No. 120	these figures refer to catalog of standard.
Scissors, straight	4 No. 109	
Scissors, curved	4 No. 108.	
Scissors, ½ sharp	2 No. 111.	

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Tissue forceps, mouse toothed	2 No. 131, of instruments
Dressing forceps, 5¼ inch	2 No. 130.
Towel forceps	10 No. 134.
Scalpels	16 (8 No. 10?; 8 No. 103).
Sharp retractor, four prong	2 pr. No. 151.
Rongeur bone forceps, Hoseley	1 pr. No. 175.
Bone gouge (Sx No. 4, 10 MM)	1 No. 184.
Needles, intestinal (No. 2 and 3 straight)	2 doz. No. 147.
Needles, intestinal (No. 3 and 4 curved)	2 doz. No. 146.
Tourniquet, army pattern	1 No. 140.
Rubber gloves (No. 7-12 pr: No. 8-12 pr.)	24 pr.
Operating gowns, caps and face masks	12 each (optional).

Small Sets Substituted in Place of Original Size Sets Furnished Some Teams

Hemostatic forceps	12 (6 large if possible).
Sharp retractor	1 pr.
Dull retractors	1 pr.
Aneurism needle	1.
Elevator, periosteum	1.
Scissors, straight, large	2 pr.
Scissors, curved, large	2 pr.
Scalpels	8.
Forceps, Rongeur	1.
Intestinal needles, straight	24.
Intestinal needles, curved	12.
Strong, full bayonet pointed round needles	12.
Plain catgut	4 doz. No. 1.
Fine black silk	1 spool.
Razor	1.
Curette, large	1.
Mouth gag	1.

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EXPERIENCE WITH A GASTROINTESTINAL SERVICE IN AN ARMY HOSPITAL

By JOHN L. KANTOR, M. D.

I. ORGANIZATION AND METHODS

THE "Section of Gastroenterology" of the medical service of United State Army General Hospital No. 14, Fort Oglethorpe, Georgia, was organized June 2, 1918, and continued in operation until June 15, 1919. The personnel consisted of the writer and from one to three other medical officers, plus a varying number of nurses and corps men, depending upon the number of patients. The bed capacity varied up to 130 as a maximum, one or more of the ward units of the hospital plant being set aside for this service. About 80 new cases were seen each month except during the last trimester of 1918, when the service was suspended almost entirely because of the "influenza" epidemic.

The special equipment consisted of stomach tubes with Ewald evacuators, duodenal tubes and accessories, a set of esophageal bougies, a proctoscope, a microscope, and the necessary glassware and reagents for the examination of fresh specimens from the digestive tract. Experience showed the advisability of maintaining a small laboratory room as an integral part of the organization. Appropriate arrangements were made for cooperation in diagnosis with the surgical, laboratory, and Roentgen departments of the hospital, and for aid in treatment, with the special diet kitchens, the dental service, and the genitourinary section.

The routine procedure in gastrointestinal cases was as follows: Immediately on admission to the service, the patient was restricted to the ward, was weighed, and was given a standard milk and egg diet. This diet consisted of a pint of milk and two eggs repeated at four-hour intervals during the day, and was regarded as satisfactorily fulfilling the following specifications: (*a*) It was sufficient to supply body needs under conditions of bed rest; (*b*) it could be tolerated in practically all acute and chronic disorders of the digestive tract; (*c*) it was standard as regards composition, amount, caloric value, and time of administration; (*d*) it was blood-free and required no further modification for the determination of gastrointestinal bleeding and parasitosis.

The morning after admission the fasting stomch was aspirated and a test breakfast administered and withdrawn. Following this, where necessary, the Roentgen examination with opaque meal was commenced and continued for twenty-four hours. As soon as acute symptoms (pain, vomiting, diarrhea, anorexia) subsided, and special tests

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such as stool examinations for blood were completed, the patient was put on the "special" diet prepared by the dietitian. This was a mixed, bland regimen, suitable for the great majority of digestive disturbances. In addition to this, the further resources of the diet kitchen as regards special service were of course available.

As the patient progressed toward recovery, and whenever possible before his discharge from the hospital, he was sent to the general mess hall to eat with the other convalescents. Weight records were kept of each patient, entries being made on the charts about twice a week.

II. ANALYSIS OF CASES

Table I shows the various types of cases seen on the service arranged in the order of frequency. The nomenclature of the Manual of the Medical Department, U. S. Army, "Changes 6," has been strictly followed with the single exception of "Malfunction of gastroenterostomy." In all 736 diagnoses were made on the 733 cases admitted. Where more than one important associated condition was found each was listed, otherwise only the most prominent finding. Since no gastrointestinal disease was discovered in 19 of the men admitted, the net total of actual cases observed was 714.

Ankylostomiasis.—The large number of hookworm cases (over 53 per cent of all admissions) furnished splendid material for the study of this condition. It was while working with this group that the intraintestinal tube treatment was devised and perfected.[1] Among other interesting observations was the fact that hookworm ova could be aspirated through the duodenal tube, although this maneuver was not successful often enough to serve as a practical aid in diagnosis. On one occasion a live worm was brought up by this method. Several specimens of copulating worms were secured, but always in the vomitus, never in the bowel movements.

The results of treatment were good. The average gain in weight approximated 6 pounds per man after a month's hospitalization. One patient who was admitted with hemoglobin of 45 per cent, greatly enlarged liver and spleen, and peripheral edema, was discharged in four months practically well with a gain of 31 pounds to his credit. It must be stated, however, that most of the men were not obviously the worse for their infection and would not have been admitted for treatment if it had not been for the uncinaria surveys that were constantly being made in the hospital and the surrounding camp organiza-

[1] This experience has been the subject of two special studies by the author: "The Intraintestinal Tube Treatment of Hookworm Infection," *Journ. Amer. Med. Assn.*, 73, 1919, 1181, and "The Cure of Hookworm Infection," *Amer. Journ. Med. Sci.*, 159, 1920.

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tions. Furthermore, the average degree of infection was not heavy, and many of the cases would have escaped detection by any but the most delicate and systematic methods of stool examination. Despite their being treated for a non-apparent condition, the spirit of coöperation on the part of the men themselves was satisfactory, and there were in fact several instances where non-patients asked for examination and received appropriate advice and treatment. The interest in the work was furthermore kept up by a fairly comprehensive publicity campaign suggested and actively supported by Dr. Lewis C. Ecker, while chief of the medical service, whereby the whole subject of hookworm disease and its prevention and treatment were presented to the soldier patients, nurses and medical officers, by a series of talks, demonstrations, and clinics.

Gastrointestinal Neuroses.—After eliminating those admitted for intestinal parasitosis, more than one-third of all cases were found to be suffering from one form or another of digestive neurosis. For the sake of latter-day analogy, the term "neuro-digestive-asthenia" may be invoked to describe this condition, but, as a matter of fact, these individuals have long been recognized as belonging to the large family of unstable asthenics who break down readily under the strain of life, and the designation of their disorder as "neuro-circulatory asthenia," "neuro-digestive asthenia," and "neurasthenia" (or "psychasthenia") is of value chiefly as it indicates the predominance of circulatory, digestive, or nervous symptoms.[2] It is the writer's opinion that surgeons were apt to err on the side of retaining such soldiers too long in the service. A direct history of repeated digestive break-downs with distinctly curtailed civilian efficiency in the past, and an increased frequency of upsets after induction or enlistment, precipitated by drill, by army food, by preventive inoculations, by exposure to excessive heat, by any of the orthodox stresses and strains of mind and body to which the recruit was subjected, should have been made a sufficient basis for the immediate withdrawal of such an individual from full duty. If, in addition, there was defective physical development (see below), and an inability to "come back" under the most favorable conditions of hospital observation, he should forthwith have been discharged for disability existing prior to enlistment. The writer has seen such cases sent to development battalions, as if by taking thought they could add a cubit to their stature! Not only was it illogical and unjust to do so (for the army owed these men nothing because of the very nature of their disability), but it was unscientific as well, since the reconstruc-

[2] For an excellent statement from the cardiologist's viewpoint see Boas, E. P.: "On the Nature of Neurocirculatory Asthenia," *N. Y. Medical Journal*, 110, 1919, 273.

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tion of these particular soldiers in any immediate sense was hopeless and would fall more properly to those interested in eugenics or social service or other similarly comprehensive community programs.

Defective Physical Development.—There was a total of 112 cases of defective physical development in the entire series. This diagnosis (which is not listed as a separate item in Table I) was made in every individual showing unmistakable objective evidence of visceroptosis and the asthenic habitus. The increased susceptibility of such men to digestive break-downs is well brought out by the following considerations: Of the total cases observed (714) those with intestinal parasitosis (403) were, as already mentioned, virtually free from dyspeptic symptoms. In this group but 34 or 8 per cent were of the asthenic habitus. On the other hand, of the remaining 311 real dyspeptics 78 or 25 per cent had defective physiques. From this it would appear that the soldier with visceroptosis was at least three times more likely to suffer a digestive break-down than was his stockier companion.

Acute Enteritis.—This occurred mainly during the summer months. Predisposing factors were heat, fatigue, and preventive inoculations. At least two small epidemics of food (meat) poisoning[3] took place in the surrounding organizations, but few of the men were sick enough to reach the hospital. The treatment consisted of bed rest, forced fluid (milk or fruit juice) diet, and no medication.

Hyperchlorhydria.—The diagnosis "hyperchlorhydria, cause undetermined," was made whenever superacidity was the only finding available for the explanation of symptoms complained of. Many additional cases of hyperchlorhydria do not appear as such in Table I because they were associated with organic diseases which are listed instead. The distinction is of course largely arbitrary because it is acknowledged that future developments in any of the so-called functional acidity cases might throw them definitely into the group of organic visceral diseases.

Duodenal and Gastric Ulcer; Malfunction of Gastroenterostomy; the Laparotomized Soldier.—The diagnosis of ulcer was made on a consideration of the following items: (1) Long standing history; (2) persistent abdominal pain and tenderness; (3) vomiting, pylorospasm, pyloric obstruction; (4) hyperacidity, hypersecretion; (5) positive Roentgen findings; (6) hematemesis. At first, such men when relieved were returned to duty marked "Domestic Service Only." Afterwards they were directly discharged on C. D. D.

The patients on whom gastroenterostomy had been previously per-

[3] See Greenwald, I.: "The Nature of the Toxic Agent in 'Meat Poisoning,'" Amer. Journ. Pub. Health, 9, 1919, 595, for a report of the work of the Harriman Research Laboratory in this connection.

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formed, presumably for ulcer, suffered either from too rapid emptying of the stomach, or, more commonly, from delayed emptying with "vicious circle." All of these were sick men and had to be discharged. The writer had begun to doubt the ability of a gastroenterostomized individual to perform any kind of military duty when, by mere chance, he came across a returned operated soldier who had been through some of the hardest kind of fighting service without the slightest digestive complaint whatever!

This brings up the general question of the lapraotomized soldier. Unfortunately no comprehensive studies of this point were made anywhere in the army as far as the writer's personal knowledge goes. A review of our own material showed that of the 714 cases admitted, 46, or over 6 per cent, had undergone laparotomies for various conditions. These men were carefully questioned as to the original indications for the intervention, and it was found that they could be divided into three groups (see Table II): (1) Those who had a clear positive indication for surgical intervention; (2) those who had no indication according to the history given; (3) those in whom the intervention was of doubtful justifiability. Of the total operated cases only nine (less than 20 per cent) were cured. The remainder were either not relieved or developed new symptoms which they attributed to the operation. Practically every one of these had to be discharged from the service sooner or later.[4]

Amebic Dysentery; Pellagra.—The fourteen cases of dysentery originated in various parts of the south or in the Philippines and reached our particular service as recurrences in every instance. There was no evidence of local hospital or camp infection. The acute exacerbations were checked with emetine intramuscularly. Further symptoms were attacked locally by quinine irrigations per rectum. No case was returned to full duty and most were dismissed from the service.

The two pellagrins were poor farmers who had been drafted into the army. Both men were infected with hookworms. The skin lesions quickly disappeared on general hospital care and a mixed diet.

Miscellaneous.—The case of malnutrition from starvation was in the person of a Porto Rican conscientious objector who was said to have refrained from all (?) food for twelve days. The family history showed that his mother and all his maternal aunts were insane or maniacal. The patient himself was a religious maniac. Otherwise he was apparently normal. In the hospital he ate all the food set before him without rebellion and gained 18 pounds in seventeen days.

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[4] For a recent expression of similar general conclusions based on extensive civilian experience, see Brown, Thos. R.: "Late Results of Supposedly Successful Abdominal Operations on the Digestive Tract," *Journ. Amer. Med. Assn.*, 73, 1919, 1501.

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The case of esophageal stricture followed an attempt at suicide by means of drinking a strong lye solution used for scrubbing. The patient recovered from the immediate effects, and the esophageal cicatrices were kept successfully dilated by bougies during the several weeks the patient was on our service. He was then removed to the psychiatric ward for observation and disposition. He remained free from dysphagia during the remainder of his stay in the hospital.

TABLE I.—*Diagnoses in Order of Frequency*

1. Total intestinal parasites	403	19. Cholangitis, ac. catarrhal	3
Ankylostomiasis	381	20. Hypochlorhydria, C. undet	3
Ascaris	7	21. Gases, deleter. effect of	3
Other nematodes	8	22. Gastrosuccorrhea	2
Cestodes	7	23. Pellagra	2
2. Neurosis, gastrointestinal	113	24. Hemorrhoids	2
3. Enteritis, ac. catarrhal	45	25. Gingivitis, ac. supp	2
4. Hyperchlorhydria, C. undet	31	26. "Autointoxication"	2
5. Ulcer, duodenal	24	27. Enteritis, chr. catarrhal	2
6. Observation, no G. I. disease	19	28. Adhesions, perigastric	2
7. Constipation, chr., C. undet	17	29. Pyorrhea alveolaris	1
8. Dysentery, amebic	14	30. Migraine	1
9. Achylia gastrica	11	31. Malnutrition from starvation	1
10. Appendicitis, chr. catarrhal	8	32. Exophthalmic goitre	1
11. Malfunction gastroenterostomy	8	33. Esophagus, stricture of	1
12. Gastritis, chr. catarrhal	6	34. Aneurysm, abdominal aorta	1
13. Diabetes mellitus	6	35. Angioma of tongue	1
14. Adhesions, intestinal	5	36. Vagotonia	1
15. Typhoid vaccination	5	37. Cancer of stomach	1
16. Ulcer of stomach	5	38. Intestinal obstruction	1
17. Gastritis, acute catarrhal	5	39. Stomach, hourglass contraction	1
18. Cholecystitis, chr. catarrhal	4		

Total diagnoses listed		763
Cases counted twice	30	
No. G. I. disease	19	
(Deducted)		49
Net total cases		714

TABLE II.—*End Results in 46 Previously Laparotomized Soldiers*

Indication for operation from patient's history	Results			
	No relief	New symptoms	Cured	Totals
Positive indication	6	7	6	19
No indication	2	2	0	4
Indication doubtful	15	5	3	23
Totals	23	14	9	46

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Conclusion.—It is not the writer's intention to draw loose, general conclusions from the above experience. Too pessimistic an impression as to the capacity of dyspeptics to qualify as fighting men is by no means justifiable. Now that such evidence is available, more than one ex-soldier will bear witness that his dyspepsia disappeared almost completely, if only temporarily, during his period of service with the colors. There is indeed no way of telling in advance in many an instance whether the disability is such as to be benefited or aggravated by military duties. The policy pursued in the recent mobilization of assigning trained men as gastroenterologists to the various base and general hospitals is decidedly to be recommended. Such men can readily build up special services that will be properly equipped to dispose adequately of all cases showing digestive disturbance. By this means much time can be saved in the weeding out of the absolutely unfit, the distribution of the moderately disabled to restricted duties, and the cure of those suffering from transient disorders.

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BLOOD TRANSFUSION

By Captain HUSSEY

BLOOD transfusion, like many modern therapeutic measures, is an old idea which has been recently developed into a practical and easily performed method. As a matter of fact an attempt was made at blood transfusion as early as the sixteenth century. During the past ten years many efforts have been directed toward improving technical methods for this procedure. These have been so successful that now it is quite possible for blood transfusion to be utilized on a broad scale.

In reviewing the many methods of blood transfusion extant for the most practicable one to be used under conditions of war in the hospitals of the zone of activity, a committee appointed by Major Finney, chief consulting surgeon for the A. E. F., gave due consideration to the many possibilities. These methods fall into two general classes, namely, the direct and indirect. In the direct methods the blood is allowed to flow from the vessel of the donor into the vessel of the recipient. This is accomplished either by bringing the endothelial lining of the vessels of the two people into apposition or connecting the vessels by means of an especially devised tube. One cannot judge the volume of blood transfused, and there are many possible misfortunes for both donor and recipient. Moreover, such procedures entail unusual surgical experience. For many obvious reasons the direct methods were considered quite out of the question, so the matter resolved itself to the consideration of the best indirect procedure. It was thought very necessary to keep in mind that, whatever method would ultimately be decided upon, it should be one simple enough to assure the possibility of a large number of men being easily and quickly trained to perform it, one that could be handled by one man, yet one which would give the best results. There are two groups of indirect methods, one in which the unmodified blood is transfused, another which utilizes some anticoagulant, thus disregarding the time element of coagulation. The unmodified blood transfusion methods are performed by the means of especially designed mechanical devices or the use of syringes. Obviously it would be impracticable to expect to supply a large enough number of any special instruments on account of the difficulties of manufacture at the present time; the syringe methods require at least two men for their performance. Furthermore, all these procedures require a certain degree of dexterity in handling them which could not be acquired as quickly as is de-

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sired in the present emergency; hence any wide application of blood transfusion would be quite impossible. Obviously, then, some indirect method using modified blood had to be decided upon. Experience has shown that sodium citrate is the best anticoagulant to use for this purpose. Although there has been some controversy about the relative merits of modified and unmodified blood transfusion, the use of the citrate method has been very favorably reported upon, and in the hands of workers who have had opportunities to use both methods the results compare very equally. The citrate method was decided upon and adopted for development to be used among the troops of the American Expeditionary Forces.

AMOUNT OF SODIUM CITRATE

Regarding the amount of sodium citrate one can use it is necessary, of course, to use a sufficient quantity that will prevent coagulation and at the same time be not of quantity sufficient to be toxic. It is generally accepted that a concentration of 0.2 per cent of this salt will prevent coagulation. Different workers vary from 0.2 to 1 per cent concentration for blood transfusion. We use a solution containing a sufficient quantity of anhydrous sodium citrate to give a concentration of approximately 0.21 per cent. There are three salts of sodium citrate to be obtained from the open market, the anhydrous salt $C_6H_5O_7.Na_3$, one containing two molecules of water of hydration $C_6H_5O_7.Na_3+2H_2O$, another containing eleven molecules of water of hydration $2(C_6H_5O_7.Na_3)+11H_2O$. We make a 42 per cent solution of the salt containing 11 molecules of water of hydration; 5 c.c. of such a solution contains 2.10 grams of the salt, which amount is equivalent to 1.518 grams of an anhydrous salt. When blood is taken from an individual for transfusion it is received into a bottle containing 100 c.c. of physiological saline to which has been added the 5 c.c. of citrate solution; it is intended that 600 c.c. of blood be taken into this solution, which will bring the total volume to 700 c.c. Then in 700 c.c. of the blood-salt solution mixture we have 1.518 grams of the anhydrous sodium citrate, enough to give a concentration of approximately 0.21 per cent. If, as is sometimes the case, the full amount of blood desired is not obtained, the concentration will of course be higher, but the actual amount of salt of course will remain the same, so after all it is a question of the actual amount of salt that is given rather than just the concentration. The citrate solution is issued in glass ampules; these are prepared by first putting in the solution, then sterilizing in the autoclave of 15-pound pressure for fifteen minutes; the ampules are then sealed in the blow flame.

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DONORS

A very important consideration in blood transfusion is the selection of individuals for donating blood. First of all such individuals must be free from any communicable disease, such as syphilis and malaria. Besides this there is certain biologic incompatibility of bloods of different individual members of the same species, so it is quite necessary to determine the compatibility of bloods before an attempt at transfusion is made. The serum of certain individuals contains bodies called agglutinins and hemolysins, which cause either the agglutination or hemolysis, or both, of the cells of other individuals. While these are not always consistent, hemolysins never exist without agglutinins. It has been determined by a number of different workers who have matched the bloods of several thousand different individuals that all persons fall into one or four groups: the percentage of these groups are about as follows: Group I, 5 per cent; Group II, 35 per cent; Group III, 10 per cent; Group IV, 50 per cent. A very convenient way to impress your mind with the possible incompatibilities of these different groups will be to follow this diagram. Assuming that the sera contain bodies we call agglutinins or hemolysins represented as *a* and *b*, and that the cells contain substances we call agglutinogens or hemolysinogens represented as *A* and *B*, and that similiar bodies act on similar bodies, then assuming the distribution of these bodies in the cells and sera of the members of the different groups as follows:

Group	*Cells*	*Serum*
I	*AB*	..
II	*A*	*b*
III	*B*	*a*
IV	..	*ab*

In Group I the cells have the *A* and *B* bodies, a serum which will cause agglutination or hemolysis of these cells must have either or both *a* and *b* bodies. It will be seen that all other sera save that of Group I contain such bodies, so the serum of a Group I individual is the only serum which will be compatible with the cells of such an individual; therefore the blood of Group I individual could not be used for transfusion to an individual a member of any other group. Now in Group IV you see the cells have neither *A* nor *B* bodies, so it will be impossible for these cells to be acted upon by the serum of an individual a member of any of the other groups. So the blood of an individual a member of Group IV can be used for transfusion to anybody. You will notice, however, that the serum of a Group IV individual contains both the *a* and *b* bodies, and one might think in

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view of this fact that such a blood transfused to an individual whose cells contain *A* or *B*, or both, bodies that such cells would be harmed. However, the high dilution that is made as the bloods become mixed renders this fact a negligible one. It might be said, however, that there are *two kinds of incompatibility, a clinical and physiological; a clinical incompatibility* would be one where the serum of the recipient contains the bodies that will affect the cells of the donor and *must not under any circumstances be admitted. The physiological incompatibility* would be an instance where the serum of the donor may affect the cells of the recipient in a concentrated suspension, but under the conditions of administration the mechanism will not be affected. In other words the rule to remember is that *the cells of the donor must not be hemolysed by the serum of the recipient.* By applying this idea you will see that it is possible to *use the blood of anybody for a Group I* individual; for this reason such individuals are spoken of as "Universal Recipients." Also you will notice that *the blood of a Group IV* individual *may be used* for the *members of any other group;* an individual belonging to this group is called a "Universal Donor." For Group II individuals it will be possible to use the blood of the same group, or of Group IV. For a Group III individual it will be possible to use the blood of the same group, or Group IV.

There are several different methods for matching bloods to make these determinations; the one we have decided upon is a macroscopic slide method devised by Dr. Vincent of Boston. In this method the serum of a Group II and a Group III individual are utilized; they have added to them sufficient sodium citrate to give a concentration of 1.5 per cent, also phenol 0.25 per cent. In most of the methods it is necessary to have washed cells and separated serum; the citrate is added to this serum so that whole blood obtained from a prick in the ear or finger can be used and coagulation will be prevented. Although the sodium citrate will interfere with the hemolysis it will not interfere with agglutination. However, in view of the fact that hemolysins do not exist unless agglutinins do, the group determination can be made on the basis of agglutination alone. We have provided a glass slide which has the Roman numeral II in the upper left-hand corner and the Roman numeral III in the upper right-hand corner. One places a drop of each of the sera on the respective ends of the slide, then takes a small amount of fresh blood of the individual to be grouped, and intimately mixes it with the serum on one end, and then another small amount of blood likewise with the serum on the opposite end; within a few seconds on one side or the other he may notice an appearance which resembles fine brick dust;

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this denotes agglutination. If this appearance occurs in the serum of Group II, we know that such cells to agglutinate must contain the *A* bodies, so the individual whose blood it was could not be a Group II individual but must be a I or III, because it would be impossible for the serum to agglutinate its own cells or the cells of a Group IV as neither of these contains the *A* body. If the cells were from a Group I individual, we should expect to find the serum of the Group III causing agglutination also, because this serum contains bodies and Group I cells contain both *A* and *B;* therefore when both sera cause agglutination the individual being tested is a member of Group I; when the serum of either II or III alone agglutinates the cells the individual belongs to the group where no change takes place. If the cells are not agglutinated by either sera, the individual belongs to Group IV.

METHOD OF TRANSFUSION

The outfit designed to carry out this work consists of two boxes containing the necessary paraphernalia for performing every technical detail of the procedure—a large box containing glassware, rubber tubing, needles, etc., and a smaller box containing the laboratory outfit for group determination, tags for identifying the individuals of the different groups, the citrate solution in ampules, solution for washing needles, and fluid for making red cell estimations. When one of these outfits is received at a hospital where it will be used, the contents of the box will be prepared for use by being separated into units, and each unit will be wrapped in unbleached muslin and sterilized as other surgical materials are prepared. When a transfusion is to be done, one of these large bottles will be unwrapped, 100 c.c. of sterile physiological saline solution will be poured into the bottle, and the contents of one of the ampules of sodium citrate solution emptied into it and mixed well.

One unit marked *donor*, consisting of a rubber stopper with two short right-angle glass tubes, one a little longer than the other, is fitted into the bottle; to the shorter of these two tubes a piece of rubber tubing is connected, and to the free end of this rubber tube a glass suction tube is connected. To the longer tube a piece of rubber tubing, about half as long as the rubber tubing just mentioned, is attached; at the free end of this tubing a needle of 25 or 20/10 mm. bore is adjusted; the apparatus is then ready for receiving the blood. The arm of the donor should be cleaned and a tourniquet placed just above the elbow just insufficiently tight to prevent arterial circulation; the veins of the forearm will now be seen to stand out

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prominently. One of these is selected for puncture, the skin over it is painted with iodine, and then a vena puncture made to obtain the desired amount of blood. While the blood is flowing into the bottle one should rotate the bottle so that an intimate mixture of blood and citrate salt solution be effected. Suction through the glass tubing with the mouth will facilitate the flow of blood. The rubber stopper with the glass tubes is now removed and in its place is put the rubber stopper with two tubes from the package marked *Recipient*. One of these tubes is very much longer than the other, reaching nearly the bottom of the bottle. To the exposed end of this glass tube a long rubber tubing about a meter in length is attached, and to the free end of this tube a small piece of glass tubing is attached. To the exposed end of the short tube a piece of rubber tubing of medium length is attached, and to its free end and a small glass tube containing a pledget of cotton is fitted. A needle of about 13/10 mm. is now selected and attached to a very short piece of rubber tubing. One blows through the tube connected with the short glass tube until the blood mixture reaches the end of the glass tube attached to the long rubber tubing; a clamp is now fixed on the rubber tubing until the needle has been successfully placed in the veins of the forearm of the recipient, the forearm having been previously prepared as in the instance of the donor. The rubber tubing attached to the needle is now connected with the glass tubing of the long rubber tubing, the bottle is elevated, the clamp released, and the blood allowed to flow into the vein of the recipient after the tourniquet has been removed. One should allow from ten to thirteen minutes for this amount of blood to be received by the recipient, or a longer time if conditions seem advisable. It must be remembered that, if the blood mixture be allowed to flow too rapidly, so much fluid may be taken into the venous circulation in such a short space of time that the right heart may not be able to accommodate it; this will be followed by unfortunate results. Quite frequently, with an individual suffering from shock or hemorrhage, the blood pressure may be so low that it will be quite impossible to get distention of the veins by the use of the tourniquet; in such cases it will be necessary to cut down on the vein and use a cannula. There are two cannulae with each outfit for this purpose.

It might be thought that the needles advised for obtaining the blood from the donor are rather large, but where such a large amount of blood is to be obtained it is quite necessary to use a large needle. There will be no difficulty experienced if the needles are well cared for and kept sharpened; so frequently does one encounter a good deal

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of difficulty in entering veins on account of using dull needles that we have in each outfit sharpening stones to be used by the operators so that they may have no difficulty in having their needles properly sharpened. Very frequently a needle may look perfectly well sharpened, but when it is examined with a low-power lens under the microscope one will notice it is very defective. It is, therefore, a wise procedure to resort to this before putting a needle into a tube for sterilization for future use. After each transfusion, the needle should be washed with distilled water, then 95 per cent alcohol, and finally with ether; then thoroughly dried, carefully examined, and sterilized with dry heat.

INDICATION FOR BLOOD TRANSFUSION

Blood transfusion is advised in all cases of shock and hemorrhage, whether existing alone or in combination. It is particularly desirable that the transfusion be done as early after injury as possible. The best indication for determining the necessity for transfusion is the blood pressure; in any case where the systolic blood pressure is 80 mm. or below, transfusion should be done immediately. However, in cases where there are severe abdominal injuries or other injuries to other parts of the body where bleeding may commence as soon as the blood pressure is elevated, the transfusion should not be done until the patient is on an operating table where a surgeon will be ready to control such hemorrhage with the greatest facility. Blood transfusion may be said to be only one, but perhaps the best of several methods used for the resuscitation of a wounded man suffering from shock or hemorrhage. It should be practiced as often as it is possible and should be made possible at all times.

RESUSCITATION WORK FOR THE WOUNDED OF THE AMERICAN EXPEDITIONARY FORCES

In view of the fact that blood transfusion, as well as other methods of resuscitation, will have wide application among our wounded troops, it has been thought advisable to have men especially trained for carrying out this work. Such men will be selected from the medical men; they will be sent in groups of about six to the Central Medical Department Laboratory, where they will receive a course of instruction which will familiarize them with the experimental facts which serve as a basis for the application of the various resuscitation methods and the technical procedure for carrying out such methods. Such men will be placed in evacuation hospitals and base hospitals; they will group a large number of possible donors, selected from the healthy

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individuals of the enlisted personnel who will be willing to donate their blood when it is needed. A record of such men will be kept where it can be referred to at any time. When a convoy of wounded arrive at the hospital, the individuals who apparently may need blood transfusion will be placed in a ward where they can be given the special attention necessary for such cases, shock bed, etc. These individuals will be grouped, blood will then be obtained from some of the donors, and transfusion can be done at any time. It is even hoped that we may be able to have men placed in more advanced aid stations where, although blood transfusion is not practicable, other resuscitation methods are, and men who have had training and experience will have acquired a degree of physiological judgment which will enable them to save the life of many a wounded soldier who perhaps would die before reaching an evacuation hospital or would at least be in such an advanced state of circulatory collapse that this condition would be hopeless and he perhaps would die a short time after reaching the hospital.

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INFLUENZA—U. S. ARMY[1]

By Colonel DEANE C. HOWARD and Major ALBERT G. LOVE
Medical Corps, United States Army

(With seven illustrations)

I

THE passing of the influenza pandemic of 1919 left in its wake a record of fatalities within a comparatively short time without precedent in the history of other pandemics or plagues, ancient or modern. The number of deaths from the disease and its complications throughout the world in 1918 has been variously estimated from six to ten millions. If the latter figure is correct, the losses from influenza in 1918 exceed by far the total battle losses of all the belligerent forces for the entire period of the World War. Unfortunately, the exact incidence of the disease and the number of resulting deaths will never be accurately known, as a tremendous toll in deaths was taken among the uncivilized races in various parts of the world where death registrations are entirely lacking. Furthermore, complete records of deaths, due directly or indirectly to influenza, will never be available from even the more highly organized communities of this country and Europe. The importance and extreme value, therefore, of accurate vital statistics for this period, as reported from a single restricted group of a population, is obvious and should serve as a sound basis for estimates as to mortality among civil populations in the absence of more reliable data.

The vital statistics of the military forces of the United States during the year 1918 give fairly accurate information as to the prevalence of influenza, pneumonia and other acute respiratory diseases, and deaths resulting therefrom, covering a military population of approximately 3,500,000 men, stationed both at home and abroad. Here, then, we have a "restricted group" for study. The military personnel, while but recently coming from civil communities, cannot be taken as fully representative of the civilian population at large, as such personnel is taken from selected age groups (18 to 45), is confined to the male sex, and is subjected to careful physical examinations to eliminate the physically and mentally unfit before being taken into the service. It is therefore a group much above the average of civil populations in physique and stamina, even as compared with the same age group in civil life. This physical superiority might be expected to lead to lower sick and death rates among military personnel than obtains in civilian populations within the same age groups, which is true with respect to most diseases.

[1] Read at the meeting of the American Public Health Association in New Orleans, La., October, 1919. Prepared in the Office of the Surgeon General, United States Army, and published by his permission.

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However, with respect to the acute respiratory diseases, other factors tend to place the military man at a disadvantage as compared with his civilian brother. It has been shown that the mortality from influenza and pneumonia during the great pandemic among soldiers in camps and cantonments was probably higher than among men of military ages in adjacent civil communities. The principal cause of the higher mortality from acute respiratory diseases among soldiers, as compared with civilians, is believed to lie chiefly in the different methods of housing and messing and the greater density of population in army camps. The housing methods in army camps and cantonments lead to a degree of congestion and close physical contact of one individual with another that has no parallel in civil communities except in institutions. In cantonments, troops were housed in large numbers in single rooms, ranging from 30 to 100 men per room, which circumstance increased the liability to contact and droplet infection from the sick to the well. When a case of influenza, measles or other acute respiratory disease makes its appearance in barrcks, a larger number of men are liable to be immediately exposed, and most of the susceptible men in a barrack room are likely to develop the disease almost simultaneously after a definite period of incubation.

In civil life, on the other hand, a man usually has a room to himself, or, at most, there may be two persons to a room, and immediate contact is limited to members of the family, a relatively small group of persons. The family itself is more or less effectively isolated from other groups (families), especially when an epidemic is prevailing. If soldiers were quartered in a similar manner, a single man to a tent or room, and could be kept from close contact with large groups of their fellows at drills, mess-halls, theaters, etc., as is possible in civil life, the incidence of acute respiratory diseases among soldiers in camps and the mortality therefrom would undoubtedly be much lower than in civil communities among men of military ages. With relation to the acute respiratory diseases, including influenza, the above-mentioned conditions place the soldier in camp at a disadvantage in his environment as compared with civilians, which more than offsets the individul superiority of physique and stamina which obviously lies with the soldier.

A word of explanation as to the machinery for the collection and compilation of vital statistics in the Army will lead to a better understanding of the completeness and relative accuracy of the statistical data on influenza and penumonia which are presented in this paper. From each camp, military post, or other station in this country and abroad, wherever American troops may be serving, individual report cards of each case of disease or injury among the military personnel are sent to the

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Surgeon General's Office. These cards show a variety of data, including age, race, years of service, nativity, dates of admission and discharge, with diagnosis, complications and disposition of patient upon completion of the case. The data on these cards are then transferred to punched statistical cards for subsequent tabulation by electric tabulating machines. It is possible by this means to assemble detailed information relative to the occurrence of special diseases in various sections of the country, in various seasons of the year, and among troops from the various stations. The statistics thus furnished are the final and accurate figures for sickness, injury, death and discharges for disability in the Army. They are analyzed in many ways and compiled to form the complex tables which appear in the annual reports of the Surgeon General, and which furnish an extremely valuable assemblage of data on vital statistics for comparison with similar material gathered in the armies of foreign nations.

Another source of information coming to the office of the Surgeon General is known as "Current" Statistics, as distinguished from the permanent and final statistics referred to in the preceding paragraph. Current statistics are based on weekly telegraphic reports which are received from every army station throughout the United States and similar cabled reports from the Chief Surgeon of Expeditionary Forces abroad. These reports give up-to-date information as to the strength of all commands, the number of admissions to hospitals and quarters, the number of new cases of communicable diseases, and the number of deaths, with their detailed causes, during the period covered by the report. Based upon these reports, morbidity and mortality rates are made week by week for all military stations and for the Army at large, which are then compiled and published in weekly bulletins ("Disease Conditions among Troops") and given wide distribution. Current statistics have been the only source of information on the health of the Army from day to day and week to week which was available for current administrative control of epidemics and other disease prevalence. The permanent statistics are never ready until long after the close of the calendar year to which they pertain, hence are of no immediate value for administrative purposes.

II. CURRENT STATISTICAL INFORMATION

Early in September, 1918, when influenza in virulent form was recognized in army camps and stations, a daily telegraphic report by the senior medical officer of every command was called for, giving the number of new cases of influenza and penumonia, and the number of deaths from these two diseases during the preceding twenty-four hours. The information thus obtained was not absolutely accurate, as final and correct

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diagnoses often cannot be reached at once. A patient reporting sick may appear to have a certain ailment and it will be so reported, but further observations of the case will show that something entirely different is the trouble. The daily reports, however, proved of the greatest value and were sufficiently accurate for all practical purposes. It was thus possible to follow the relative progress or abatement of epidemics in various camps, which indicated the station or stations to which personnel and supplies should be sent or withdrawn, and to what places and at what times it would be safe to move healthy troops. In fact, every administrative act in connection with the management of epidemics at camps and stations was based on telegraphic reports, which kept the

TABLE I.—*Troops in United States. New cases of influenza and pneumonia, and deaths therefrom, week by week, during the last four months of* 1918 *and the first four months of* 1919.

(*From weekly telegraphic reports*)

Week ending	Strength	New cases		Deaths		
		Influenza	Pneumonia	Pneumonia	Influenza	Total
1918						
September 6	1,530,059	.....	333	40	.....	40
September 13	1,688,786	.....	332	36	.....	36
September 20	1,638,164	11,689	758	96	2	98
September 27	1,628,690	37,943	4,313	953	19	972
October 4	1,598,303	88,478	8,655	2,431	13	2,444
October 11	1,572,055	89,152	17,882	6,005	165	6,170
October 18	1,545,397	43,799	11,013	5,289	270	5,559
October 25	1,534,667	19,966	5,575	2,368	256	2,624
November 1	1,504,902	18,175	2,861	1,113	70	1,183
November 8	1,533,672	6,887	2,392	765	143	908
November 15	1,544,077	4,485	1,335	455	64	519
November 22	1,549,343	3,936	1,079	289	32	321
November 29	1,524,722	3,000	1,136	276	43	319
December 6	1,467,918	4,056	1,120	241	14	255
December 13	1,333,620	3,630	1,061	292	19	311
December 20	1,142,378	1,957	814	230	10	240
December 27	1,045,971	1,191	532	174	13	187
Total	.....	338,344	61,191	21,053	1,133	22,186
1919						
January 3	968,935	1,262	518	123	8	131
January 10	931,549	1,888	567	171	4	175
January 17	876,298	1,897	202	184	5	189
January 24	810,592	1,442	611	175	5	180
January 31	749,007	939	394	112	3	115
February 7	668,981	728	220	72	3	75
February 14	623,405	637	205	67	0	67
February 21	590,197	550	245	56	1	57
February 28	551,821	607	227	57	4	61
March 7	540,525	389	189	47	6	53
March 14	529,775	342	174	39	1	40
March 21	531,018	250	106	32	2	34
March 28	502,411	281	136	26	1	27
April 4	463,372	170	90	21	2	23
April 11	460,743	244	93	18	2	20
April 18	438,999	208	102	11	3	14
April 25	422,655	101	55	10	3	13
Total	.....	11,935	4,134	1,221	53	1,274
Grand total	.....	350,279	65,325	22,274	1,186	23,460

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Surgeon General's Office as closely informed regarding disease conditions at stations throughout the United States as the health officer of a municipality is kept informed regarding health conditions in the various subdivisions of his jurisdiction. By reviewing the current statistics during the period of the influenza epidemic, it is possible to readily follow the rise and fall of the disease in the various camps throughout the United States and compare the records of one camp or station with others, and the incidence and mortality of the disease in individual camps and stations with that of troops in the United States as a whole.

In the Army, as in civil communities, the true incidence of influenza and the mortality therefrom are not fully shown by the recorded cases and deaths. This discrepancy was anticipated during the course of the great epidemic and is fully confirmed now that the final statistics are available. Probably hundreds of deaths among our troops during the period of the epidemic, reported as due to lobar- or broncho-pneumonia, without reference to influenza as an antecedent cause, were in fact due to pneumonia either complicating influenza or as a sequel to that disease. Pneumonia devleoped so early in many cases, and, in fact, was so clearly in evidence when the case was first seen by a medical officer, that it is not strange, when hundreds of new cases were admitted to sick report daily in our large camps, that the underlying cause, *i. e.*, influenza, was not always appreciated and recorded. In some camps, early in the epidemic, the diagnosis of influenza was not made unless confirmed bacteriologically, and in other hundreds of cases of "acute bronchitis" or "acute streptococcus infection of the respiratory tract," with high percentage of complicating pneumonias, were reported, when later investigation demonstrated conclusively that the disease was the same type of influenza then prevailing in other camps. To eliminate errors in diagnosis and to gain a fairer perspective relative to the actual effect of the influenza epidemic on the death rate of the Army, it is desirable to group together all reported cases and deaths from influenza, pneumonia, empyema and other acute respiratory diseases during the epidemic period, and assume that the great majority of them were the direct or indirect results of influenza.

The first authentic cases of virulent influenza of the great autumn pandemic among troops in the United States appeared on September 7, 1918, at Camp Devens, Massachusetts. The disease was not at once recognized, the fulminating character of the infection suggesting cerebro-spinal meningitis. Other cases appeared on September 8, and thereafter the number of cases rapidly increased from day to day. The height of the epidemic was reached on September 20, thirteen days after the appearance of the first authentic case. By the 30th of September this one

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camp had reported approximately 10,000 cases of influenza, nearly 2,000 cases of pneumonia, with 500 deaths, from a command of approximately 45,000 men. This brief description of the course of the epidemic at Camp Devens may fairly be applied to nearly all other army camps of the cantonment type which were subsequently infected. The disease extended rapidly westward and soutward, other camps being attacked in the following order and on the following dates:

Camps	*Date of attack (as reported)*	*Camps*	*Date of attack (as reported)*
Upton	September 13	Meade	September 20
Lee	September 17	Grant	September 22
Dix	September 18	Taylor	September 22
Jackson	September 18	Sevier	September 23
Hoboken	September 19	Lewis	September 23
Syracuse	September 19	Sherman	September 23
Gordon	September 19	Newport News	September 23
Humphreys	September 20	Pike	September 24
Logan	September 20	Beauregard	September 25
Funston	September 20		

(Other camps at later dates.)

For troops in the United States as a whole the height of the epidemic extended over a period of about nine weeks (September 13 to November 15). For each individual camp the duration of the epidemic was about four weeks. Thus the period from September 13 to November 15, 1918, represents the period of highest mortality from influenza-pneumonia. Subsequent to November 15, influenza of a milder type continued in nearly all camps for the greater part of the winter 1918–1919, but with relatively fewer cases, fewer complications and fewer deaths than occurred during the early weeks of the epidemic. The mortality rates, week by week, subsequent to November 15 more or less approximated those obtaining during the corresponding period of 1917, when measles and measles-pneumonia were reported as the chief causes of death. Most of the pneumonias of 1918–1919 were complications of influenza. Measles and measles-pneumonia ceased to be a factor of any considerable importance in death rates in army camps in the United States during the winter of 1918–1919, as immediately upon the signing of the armistice all draft calls were cancelled and only seasoned men, more or less immune to measles, remained in camps during the winter.

In France the epidemic followed much the same course and extended over much the same period of time as in the United States. The high-water mark for deaths from influenza and pneumonia among troops in the United States was 6,160 for the week ending October 11, and in the

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A. E. F., France, 1,451, for the week ending October 17, 1918. There were approximately 1,600,000 officers and men in the United States and the same number in the A. E. F., France, during the months of September, October, November and December, 1918. It is of interest to note that the disease was much less prevalent and fatal among our troops of the Expeditionary Forces than among troops in the United States. During the last four months of 1918 deaths from influenza and pneumonia numbered 22,186 in the United States and 8,842[2] in the A. E. F., France, the respective commands being of approximately equal strength. The question arises: Why should the disease have been so much more fatal in camps in the United States than among our troops abroad? These explanations suggest themselves:

(*a*) Camps in the United States were filled to overflowing with new draftees who were unaccustomed to army conditions, who were unseasoned, and who were huddled together in large groups under conditions most favorable for contact and droplet infection from man to man. Troops in the United States were therefore more susceptible to all camp diseases, including influenza, than were the more seasoned troops composing the A. E. F., in France. Furthermore, unseasoned troops when attacked by disease are less resistant to the effects of the disease than seasoned troops.

(*b*) The practice of housing men in large numbers in a single room in cantonments in the United States was conducive to high incidence of any prevailing acute respiratory disease, especially influenza and its most serious complication, pneumonia. In France, conditions were entirely different. Practically all combat divisions were in the advance zone at the time and well spread out over wide areas. Where troops were billeted, the men were separated in small groups in their billets and shelters and were able to remain more or less isolated from other groups. Further, they were living more or less in the open during active operations, and while it might be assumed that individual resistance would be greatly reduced by the fatigue and stress of battle and that such troops would be more susceptible to influenza, it appears that the wide separation of these men and their life in the open, during this period, more than offset the disadvantageous conditions of fatigue and stress under which they were living. It is commented upon by medical officers who served in France that in commands of the service of Supply, where troops were housed in barracks with a large number of men to a single room, the epidemic ran much the same course with high mortality as it did in cantonments in the United States. It was observed

[2] Final statistics charge 11,670 deaths to influenza and pneumonia in the A. E. F., France, during the last four months of 1918.

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that the percentage of infection and the fatalities from influenza and pneumonia in France were much greater among troops of the Service of Supply than among troops at the front. There is but one explanation that satisfactorily covers this divergence, and that is the different method of housing and the degree of dispersion of men over wide areas at the front as against the crowded barracks or restricted areas in the Service of Supply.

(*c*) Soldiers in France were of longer service and a large proportion of them had passed the preceding winter in camps in the United States. Many of them may have had influenza in a mild form earlier in their service and thus acquired a relative immunity.

It is of interest to note the effect of this epidemic on the gross death rate from disease week by week during this period.[1]

During the summer and early fall of 1918 the death rate from disease had remained exceedingly low. Between July 1 and September 21 the highest death rate from disease among troops in the United States was 3.1 (week ending July 5, 1918) and the lower rate, 2.1 (week ending July 26). In the A. E. F., France, death rates for disease were slightly higher than in the United States but still remarkably low during the months immediately preceding the outbreak of the epidemic. The effect of the epidemic on gross death rates from disease is first noticed in records for the week ending September 21, both in the United States and in France. During the following four weeks mortality rates mounted upward to unprecedented heights (206.4 in the United States and 44.7 in A. E. F., France). It will be noted that the decline in death rate from week to week following its highest point is much more gradual than was its rise.

TABLE II.—*Effect of Influenza on Gross Death Rate for Disease, September, October, November, 1918. (Current statistics)*

Troops in U. S.		Troops in A. E. F., France	
Week ending	Annual death rate (disease)	Week ending	Annual death rate (disease)
September 13	2.3	September 13	1.1
September 21	4.4	September 21	7.9
September 27	32.4	September 27	14.6
October 4	81.8	October 4	20.1
October 11	206.4	October 11	41.6
October 18	190.1	October 18	44.7
October 25	92.7	October 25	35.0
November 1	43.2	November 1	30.8
November 8	33.0	November 8	21.5
November 15	19.7	November 15	12.9
November 22	13.7	November 22	12.7
November 29	13.2	November 29	12.6

[1] All rates quoted in this paper are annual rates per 1,000. The annual rates (current statistics) are based upon the number of cases and deaths occurring weekly reduced to an annual basis.

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The death rates from disease among troops in the United States for the last four months of the preceding year (1917) may be taken, for purposes of comparison, as a normal rate for that period of the year in estimating the number of deaths that would have occurred in the United States in 1918 if epidemic influenza had not prevalied. The number of deaths (disease only) from September 13 to November 15, 1918 (the period of the height of the epidemic), in excess of the number of deaths that would have occurred if the death rate for 1917 had prevailed can fairly be taken as representing deaths resulting from the epidemic of influenza (Table III). Even this comparison will not indicate in full measure the baleful influence of the epidemic on gross death rates from disease during this period, for the following reasons:

(*a*) In 1917, measles was epidemic in nearly all Army camps and caused considerable mortality through the incidence of secondary pneumonias. In 1918, measles epidemics were not prevailing.

(*b*) The physical conditions surrounding the troops in the United States in 1918, such as shelter, clothing, hospital facilities, weather conditions, etc., were immeasurably better than during the preceding season.

It will be noted that the peak of the curve as regards deaths from disease among troops in the United States was reached on October 11. The virulent type of influenza had spread rapidly from camp to camp, from the Atlantic seaboard to the south and west, due to the continual interchange of personnel from infected to non-infected camps. Such movements of troops at this time were recognized as dangerous and inadvisable, and prompt recommendations were made by the Medical Department that such movements be discontinued or greatly restricted, if compatible with military interests, which, of course, were at the time paramount. The War Department was unable to approve any marked restriction of movement of men from camp to camp at this time. One result of the free inter-communication of military personnel was that practically all military stations in the United States were in the throes of the epidemic at the same time.

It must be said that very little effective prevention was accomplished during this epidemic in army camps or stations. In camps where all accepted measures for the prevention of the spread of respiratory diseases were vigorously enforced, the incidence of the disease apparently was as great as in other camps where such measures were less rigidly and effectively applied. It is probable that practically all susceptible human material in infected camps suffered from an attack of the disease during the continuance of the epidemic. The records from various camps indicate that from 15 to 40 per cent of com-

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TABLE III.—*Troops in United States. Approximate Strength* 1,600,000 *During Height of Influenza-Pneumonia Epidemic.*
(Current statistics)

Week ending	Death rate (disease only)		Number of deaths that would have occurred from disease in 1918 if the 1917 rate had prevailed	Number of deaths actually occurring from disease in 1918	Number of deaths from disease in 1918 in excess of the number that would have occurred if 1917 death rate for disease had prevailed
	1917	1918			
Sept. 20....	1.18	4.47	37	141	104
Sept. 27....	1.18	32.49	37	1,018	981
Oct. 4....	1.2	81.82	37	2,515	2,478
Oct. 11....	1.7	206.41	51	6,240	6,189
Oct. 18....	1.9	190.19	56	5,649	5,593
Oct. 25....	2.08	92.71	61	2,737	2,676
Nov. 1....	2.1	43.15	61	1,249	1,188
Nov. 8....	4.1	33.05	121	975	854
Nov. 15....	5.1	19.76	151	587	436
Total.....	.....	.....	612	21,111	20,499*

* This total represents the number of deaths from disease during the height of the influenza-pneumonia epidemic which may be considered properly chargeable to the effects of influenza during this period.

mands suffered from an attack of the disease. These records, as previously stated, do not indicate in full the true incidence of the disease. Certain good results were accomplished in some camps by the application of effective and early isolation of patients and suspects and other measures generally recognized as of value. It was sometimes possible to retard the progress of the epidemic and cause it to be spread over a longer period of time. The epidemic thus became less explosive in character, and fewer people were under treatment at the same time. It was possible to take better care of the sick and thus reduce the incidence of and deaths from complicating pneumonia. It has not been shown that such measures accomplished reduction in the absolute number of cases of influenza occurring in one command as compared with another.

The "cantonment" group of camps gave a much higher death rate from influenza and its complications than the "tent" camp or "departmental" group (see chart). At first glance it would appear that the different housing conditions and the more marked overcrowding in cantonments at the time would fully account for this divergence. Closer study, however, leads to the conclusion that geographical location was a factor of equal or greater importance. It is well known that the disease was most virulent and fatal in the northern, eastern and middle west states, a district in which cantonments predominated. In the southern and Pacific coast states, where the most of the tent camps were located, a milder type of the disease prevailed, with fewer resultant fatalities. Camp Lewis, Washington, and Camp Gordon, Georgia (both cantonments), had relatively low death rates, approximating those of nearby tent camps. On the other hand, Camp Syracuse, New York, and Camp Colt, Pennsylvania (both tent camps), suffered severely

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and reported death rates approximating those of cantonments in the same geographical district.

III. PERMANENT STATISTICAL INFORMATION

(*a*) *Historical.*—Before considering in detail the statistics for these diseases for the year 1918, it is of interest to review briefly the history

TABLE IV.—*Influenza, Pneumonia and Common Respiratory Diseases** (1862–1918 *Inclusive*)

DEATHS ENLISTED MEN—AMERICAN TROOPS (EXCLUDING NATIVE TROOPS AND OFFICERS)

Ratios per 1,000

Year	Common resp. dis., ratio	Influenza, ratio	Pneumonia, ratio	Total resp. dis., ratio	All diseases ratio	Mean strength (annual)
1862	0.92	0.03	7.45	8.40	49.33	288,919
1863	1.06	0.03	7.23	8.32	68.21	655,955
1864	1.27	0.02	8.99	10.28	58.63	721,420
1865	1.17	0.00	8.00	9.17	66.63	734,649
1866	0.78	.....	4.26	5.04	60.58	158,514
1867	0.38	.....	1.82	2.20	48.82	47,233
1868	0.36	.....	1.31	1.66	11.65	47,472
1869	0.26	.....	0.68	0.94	9.00	35,221
1870	0.25	.....	1.38	1.63	12.02	31,831
1871	0.14	.....	1.26	1.39	10.30	29,430
1872	0.26	.....	1.34	1.60	10.13	26,844
1873	0.39	0.04	1.18	1.61	10.28	27,909
1874	0.22	.....	0.81	1.04	7.51	27,021
1875	0.13	.....	1.02	1.15	8.25	23,525
1876	0.04	.....	1.05	1.09	6.96	24,866
1877	0.34	.....	0.89	1.22	7.26	23,707
1878	0.26	.....	0.64	0.90	7.48	23,381
1879	0.17	.....	0.75	0.92	5.68	23,964
1880	0.08	.....	1.33	1.42	6.04	24,002
1881	0.34	.....	0.78	1.12	7.19	23,222
1882	0.17	.....	0.90	1.08	7.01	23,239
1883	0.09	.....	0.68	0.77	8.23	23,439
1884	0.21	.....	0.87	1.08	7.45	23,034
1885	0.11	.....	0.64	0.75	4.33	26,542
1886	0.15	.....	0.61	0.77	5.75	26,095
1887	0.04	.....	0.99	1.02	5.65	26,365
1888	0.07	.....	1.42	1.50	6.10	26,739
1889	0.04	.....	0.70	0.74	3.97	27,206
1890	0.07	0.22	0.52	0.82	5.25	26,684
1891	0.08	0.83	0.76	1.66	5.03	26,460
1892	0.11	0.22	0.63	0.97	4.36	26,861
1893	0.04	0.11	0.65	0.80	4.01	27,659
1894	.....	0.07	0.65	0.72	4.16	27,664
1895	0.07	0.16	0.48	0.71	3.85	25,204
1896	0.04	0.08	0.36	0.48	4.14	25,119
1897	.....	0.07	0.24	0.31	3.38	25,417
1898	0.06	.....	0.92	0.98	24.97	147,795
1899	0.04	0.05	0.94	1.02	11.76	105,546
1900	0.07	0.01	0.40	0.48	15.79	100,389
1901	0.01	0.01	0.57	0.59	9.58	92,491
1902	0.07	.....	0.58	0.66	12.15	80,778
1903	0.06	.....	0.43	0.49	5.33	67,643
1904	0.03	.....	0.73	0.77	3.87	58,740
1905	0.02	0.02	0.35	0.39	3.52	56,901
1906	0.01	0.01	0.28	0.32	3.28	56,443
1907	0.07	0.02	0.46	0.56	3.44	53,803
1908	0.03	0.02	0.40	0.44	3.48	65,406
1909	0.05	0.01	0.34	0.40	3.02	74,319
1910	0.03	.....	0.36	0.39	2.44	71,534
1911	0.04	.....	0.36	0.40	2.66	72,748
1912	0.03	.....	0.22	0.24	2.37	78,267
1913	0.05	.....	0.32	0.37	2.57	80,766
1914	0.01	.....	0.21	0.23	2.36	87,228
1915	0.03	0.04	0.38	0.45	2.60	93,262
1916	0.01	0.01	0.36	0.38	2.60	99,186
1917	0.06	0.02	1.63	1.71	5.09	639,645
1918	0.61	9.41	6.44	16.46	19.37	2,379,555

* Common Respiratory Diseases: Pleurisy, laryngitis, bronchitis, tonsillitis, naso-pharyngitis and pharyngitis.

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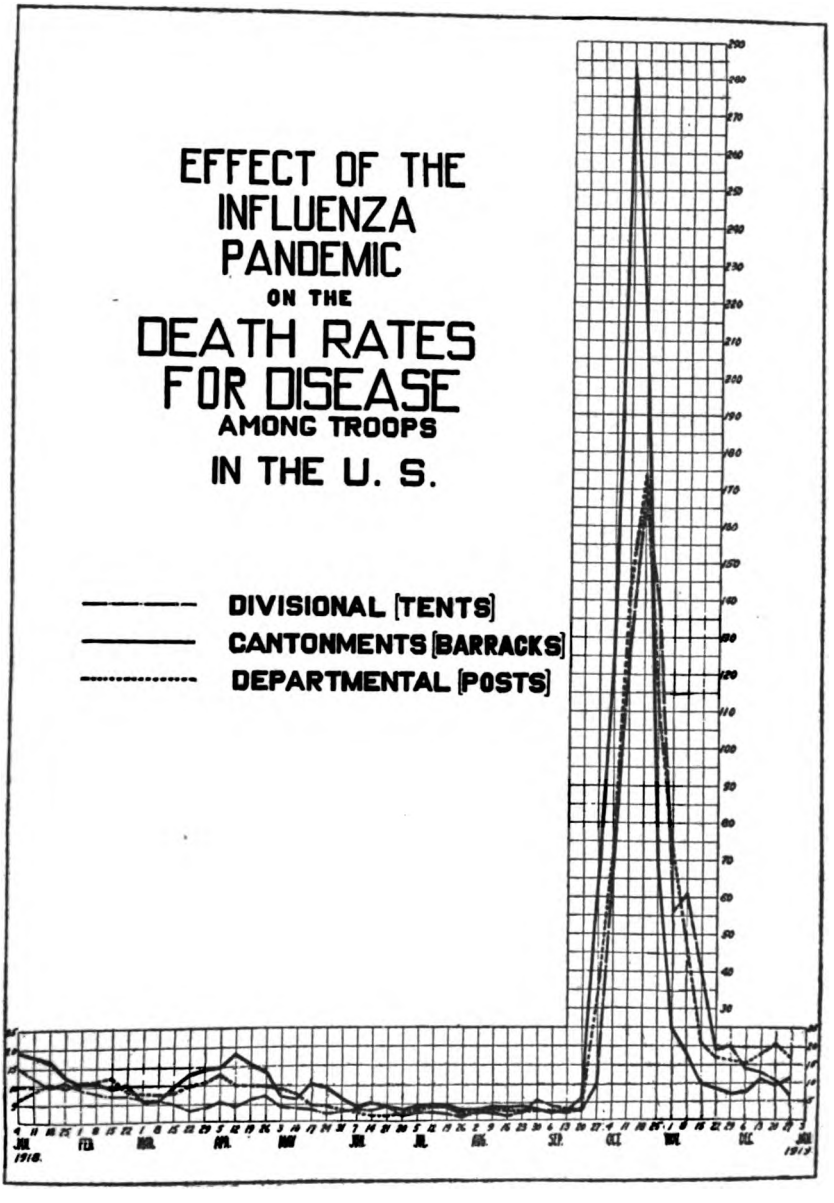

CHART 1.

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of influenza, pneumonia and common types of acute respiratory diseases in the Army in previous years. Table IV shows the rates per 1,000 men for deaths, 1862 to 1918 inclusive, for influenza, pneumonias and the common types of respiratory diseases separately and combined.

Influenza, or "epidemic catarrh" (as it was then called), was reported each year from 1862 until the present time. No deaths were attributed to the disease from 1865 until the year 1890, with the exception of one case in 1873. Between 1890 and the present time there were a number

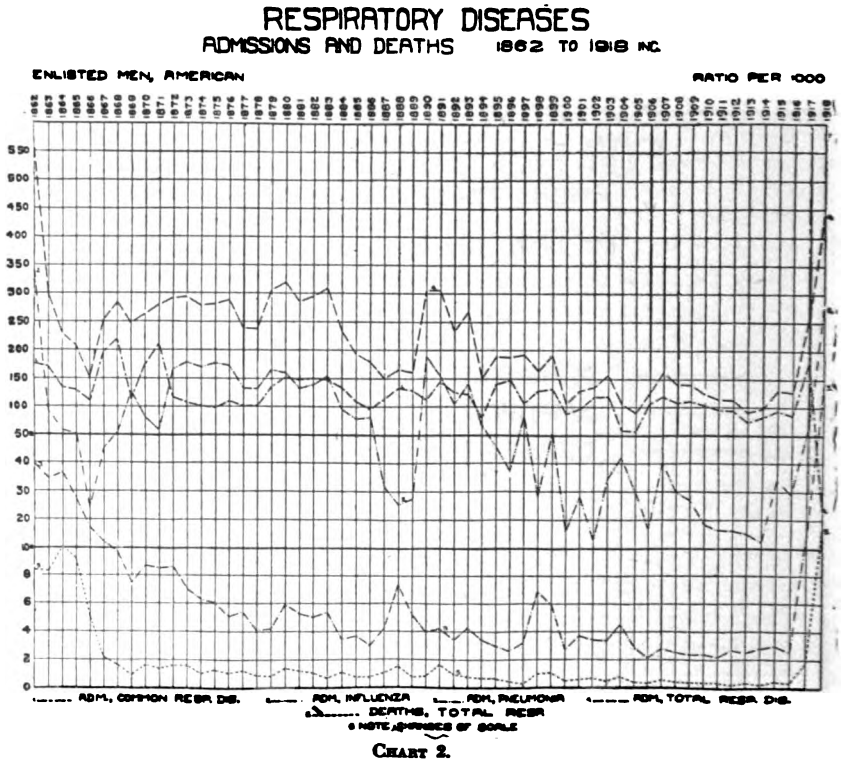

CHART 2.

of years when no deaths were charged to this disease. In 1888, a marked rised occurred in the death rate from pneumonia. In the two years immediately preceding the historic influenza epidemic of 1889–1890 there was an increase in the admission rates for acute respiratory diseases, including pneumonia, but a decrease in the admission rate for influenza. It was in 1890 that the epidemic of influenza of that period was first recognized in the Army. As a result the admission rate for influenza increased from 27.63 per 1,000 for the preceding year to 189.44 for 1890. The death rate for respiratory diseases showed only

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a slight increase over that of the preceding year, being 0.82 per 1,000 as compared with 0.74. In 1891, the death rate from acute respiratory diseases was 1.66, the rate of 0.76 being charged to primary pneumonia and 0.83 to influenza. After 1891 both the death and admission rates for respiratory diseases steadily declined.

We find recorded in the annual report of 1891 in a discussion of the sickness for the year 1890 that—

> the epidemic of this disease, the so-called grippe, was developed in Boston and New York during the last week of December, 1889, and thence it spread with few exceptions to our military stations during the course of January and February, 1890. The epidemic reached its height at a given place on an average of twelve days from its invasion and lasted about 30 days. During the visitation from 5 to 90 per cent, average about 33 per cent, of each affected command suffered, but it prevailed as extensively among the camp attaches and in the neighboring civilian settlements as at the posts. At a few of the stations the medical officers did not recognize the presence of this disease. At some of these stations the medical officer is positive in his assertion that no epidemic of influenza was felt. Nevertheless, it is possible that the disease may have visited some of the posts mentioned without leaving its mark upon the records.

Among the theories relative to the spread of the disease appear the following, which is as true today as applied to the spread of the recent pandemic as it was in 1890 and 1891:

> The disease traveled westward notwithstanding a west wind and its invasion was later in the season in proportion to the length of stage travel to reach the post. The more distant posts escaped the epidemic entirely. An epidemic wave was wholly inconsistent with the facts and the propagation could be explained only on the assumption of a personal contagion carried from place to place by rail or other means of personal transportation.

During the Spanish-American War there was some increase in the death rate for acute respiratory diseases. In 1898 it was 0.98, as compared with 0.31 for the preceding year. In 1899 it was 1.02, and in 1900 it showed a marked decline to 0.48. From this time on the admission and death rates for acute respiratory diseases showed a tendency to decline, with some slight fluctuations, from year to year.

In 1917, the death rate for the acute respiratory diseases (influenza, pneumonias and the common types) increased to 1.71. During the fall of 1917, after the camps were filled with drafted men, acute epidemic diseases swept through a number of them. Measles was one of the most prevalent and one of the most fatal of the infectious diseases that occurred. It was noted during the fall and early winter that there were a number of cases of pneumonia which were unlike the pneumonia that ordinarily occurred. This was apparent both to the physicians in civil life and in the army camps. It was reported by all classes of practitioners that numerous cases of pneumonia were occurring which

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resembled the pneumonia following measles, but occurring among men who had not had measles recently. In a number of the camps, both in the north and in the south, rather extensive epidemics of pneumonia occurred and a number of deaths resulted. The same variety of pneumonia occurred in the late winter and spring of 1918. In many of the camps pneumonia was practically epidemic during March and April. In many camps a number of cases occurred later in the spring and summer. It was again reported by a number of medical men that these cases of pneumonia that were occurring were different from the types of pneumonia ordinarily encountered and very similar to pneumonia following measles, but, again, that the cases occurred among men who had not had measles recently.

During 1917, a large number of cases of influenza had been reported in the United States Army, approximately 40,512. However, it was not apparent at that time that influenza might be present in a fatal epidemic form. Consequently no separate tabulations by camps by months were made for the annual report. It was again observed in the reports received from the camps during the early part of 1918, and especially for the months of January, March and April, that there were many cases of influenza being reported as well as many fatal cases of pneumonia. Few of the influenza cases during the early part of 1918, and practically none during the latter part of 1917, were reported as associated with pneumonia. It was not until later in the year, when it was recognized that the fatal epidemic form of influenza was present, that pneumonia was reported as a frequent and fatal complication.

It appears probable that unrecognized influenza may have been the primary and underlying cause of much of the fatal pneumonia which occurred in army camps late in 1917 and during the early months of 1918.

(*b*) *Influenza in* 1918.[4]—It is a disputed question whether the epidemic appearing in our camps in September, 1918, was due to a fresh importation from abroad of a virulent type of disease, or to the continuance of the mild influenza of the early spring of 1918, which, from some undetermined cause, had suddenly acquired increased virulence. Good arguments are advanced on both sides of the question. No purpose will be served by attempting discussion of this disputed point in this paper. Whatever its origin, the appearance of influenza of virulent type among our troops was not unexpected, in view of the widespread distribution of the disease in Europe and elsewhere during the preceding months and the history of former pandemics of this disease.

[4] In the various charts and tables prepared from the "permanent" statistics, all deaths are charged to the month in which the disease occurred. Rates for Camp Mills are unreliable. It was an embarkation camp.

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DEATHS

INFLUENZA, PRIMARY PNEUMONIA & COMMON RESPIRATORY DISEASES

LARGE CAMPS
LAST QUARTER 1917 AND THREE PERIODS 1918

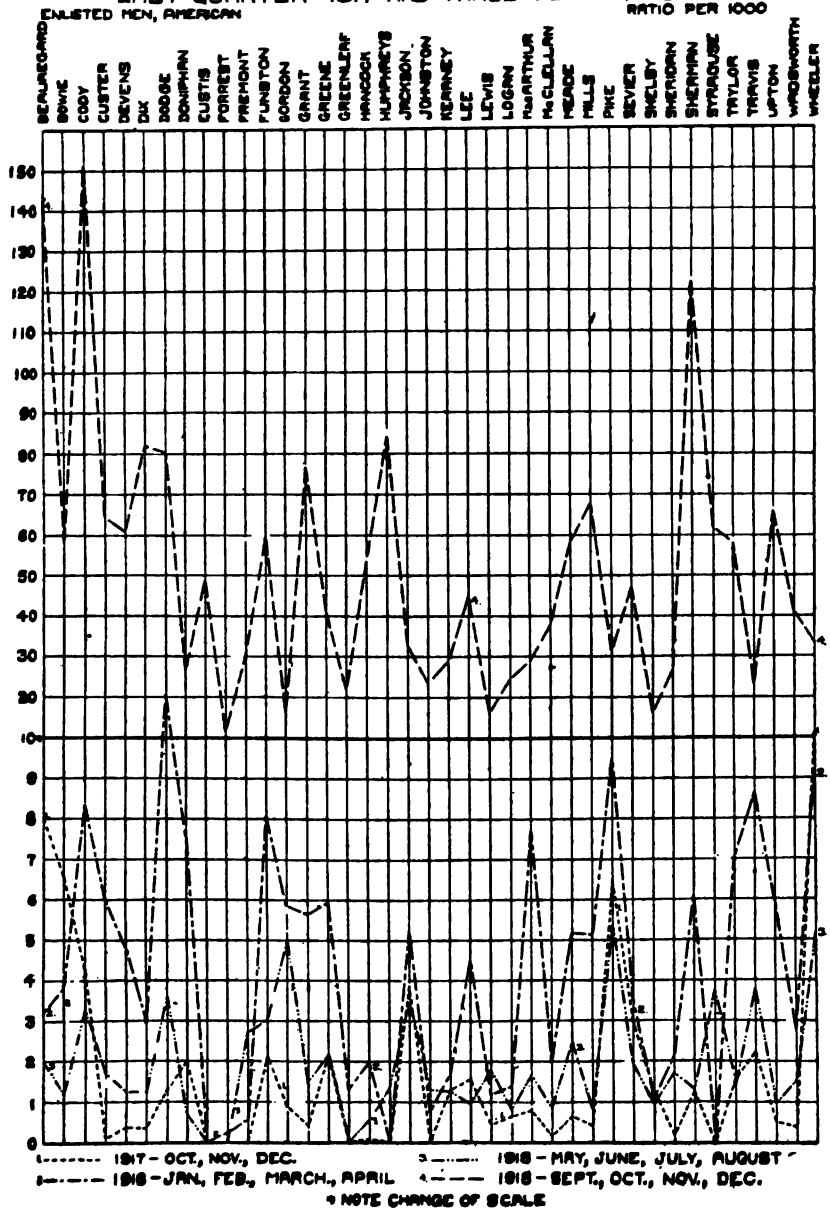

CHART 2.

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The permanent statistics of influenza, pneumonia and other acute respiratory diseases for the calendar year 1918 are now available. The statistical data referred to earlier in this text were based on information contained in telegraphic reports, which are recognized as incomplete and subject to correction. Wherever discrepancies are apparent between "current" and "permanent" statistics, the latter always take precedence. In current statistics influenza was not reported as a separate disease until the outbreak in September, 1918, while the final and permanent statistics give the complete record of influenza and other acute respiratory diseases covering all American troops at home and abroad for the entire calendar year. Table V shows for pneumonias, influenza and the common types of acute respiratory diseases the monthly admission and death rates per 1,000 for troops in the United States and in Europe.

Influenza was the leading cause of admission in every country where troops of the United States were serving during the year. There was charged to influenza the total of 688,869 admissions for the entire Army during the year. The admission rate was 273.52. In addition, it is certain that many of the ordinary acute respiratory diseases should have been charged to influenza.

There were 23,007 deaths attributed to influenza for the year, giving a rate of 9.14. In addition to this number of deaths, there were 431 charged to bronchitis, 6,814 to broncho-pneumonia, 8,407 to lobar-pneumonia, 450 to pneumonia unclassified, and 262 to pleurisy. If these deaths were added to the total deaths from influenza the number would be 39,371, giving a rate of 15.64 per 1,000 for the acute respiratory diseases out of the total disease death rate of 18.81 for the year. In the pre-war period (1915) the percentage of deaths from this group of infections was something under 18 per cent of the total from all diseases. If in 1918 the death rate for these acute respiratory diseases is deducted from the total rate for the Army for the year, it leaves the exceedingly low rate of 3.18 for the year for all other diseases.

The influenza death rate for enlisted men, American troops, was highest in the United States (12.02); second in Europe (6.07); third in Panama (1.09); fourth in Hawaii (0.55); fifth in the Philippine Islands (0.14). By race it was highest for the colored troops (12.69); second for the white (8.83); third for Porto Ricans (7.80); fourth for the Filipinos (2.84); and fifth for the Hawaiians (1.72). While the native troops had higher admission rates than the whites, the death rates were lower, which again illustrates the point that the death rate for this type of disease is lower in the summer and in the tropics.

The combined death rate for broncho-and lobar-pneumonia (not a

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TABLE V.—*Influenza, Pneumonia, Common Respiratory Diseases and Total for the Three Groups Admissions and Deaths by Months, Enlisted Men Only.*
Rates per 1,000

Date	United States				Europe			
	Admissions							
	Influenza (all)	Primary pneumonia (all)	Other resp.†	Total resp.	Influenza (all)	Primary pneumonia (all)	Other resp.†	Total resp.
1917								
Oct.*	31.78	12.18	.....	.....	.....	.....	.....	.....
Nov.*	82.92	31.42	.....	.....	.....	.....	.....	.....
Dec.*	139.31	36.11	.....	.....	.....	.....	.....	.....
1918								
Jan	145.19	37.98	388.71	571.88	160.50	33.46	268.50	462.46
Feb	100.65	22.58	252.00	375.23	84.13	15.20	141.61	240.94
Mar	226.75	26.39	279.71	532.85	95.29	25.32	142.06	262.67
Apr	362.91	25.81	235.90	624.62	94.30	15.60	106.43	216.33
May	103.84	14.21	141.37	259.42	128.96	11.56	74.10	214.62
June	41.72	7.41	88.16	137.29	134.37	7.92	44.46	186.75
July	34.11	7.60	88.05	129.76	60.29	6.39	29.55	96.23
Aug	38.95	11.11	98.10	148.16	61.87	6.37	27.14	95.38
Sept	646.00	37.30	180.64	863.94	234.26	27.33	44.22	305.81
Oct	1,774.50	80.82	176.64	2,031.96	344.85	50.45	61.87	457.17
Nov	191.16	19.73	189.10	399.99	164.26	16.29	65.52	246.07
Dec	147.46	18.01	247.45	412.92	146.45	16.31	92.04	254.80
Total, 1918	361.21	26.27	190.03	577.51	167.19	20.46	65.44	253.09
	Deaths							
1917								
Oct.*	.....	.94	.....	.....	.....	.....	.....	.....
Nov.*	.....	4.56	.....	.....	.....	.....	.....	.....
Dec.*	.....	6.77	.....	.....	.....	.....	.....	.....
1918								
Jan	.20	6.09	.06	6.35	.30	5.53	.48	6.31
Feb	.07	2.76	.01	2.84	.....	2.01	.26	2.27
Mar	.37	5.88	.05	6.30	.12	3.26	.20	3.58
Apr	.48	5.54	.03	6.05	.21	1.41	.12	1.74
May	.21	2.35	.06	2.62	.28	1.23	.20	1.71
June	.14	.90	.03	1.07	.30	1.23	.12	1.65
July	.32	.97	.03	1.32	.28	.95	.06	1.29
Aug	.45	1.79	.02	2.26	.93	1.57	.10	2.60
Sept	39.55	12.86	1.26	53.67	13.57	11.23	.75	25.55
Oct	70.03	25.15	.22	95.40	20.87	22.57	.88	44.32
Nov	6.34	2.90	.21	9.45	3.97	3.56	.53	8.06
Dec	4.08	2.38	.31	6.77	2.53	2.65	.40	5.58
Total, 1918	12.02	6.31	.20	18.53	6.07	6.46	.43	12.96

* Rates for large camps only.

† Including acute bronchitis, pharyngitis, tonsillitis, laryngitis, naso-pharyngitis and pleurisy reported as primary.

NOTE.—All deaths charged to months in which the disease occurred.

complication or sequela of other diseases) for officers was 2.41; for enlisted men, American Troops, 6.25; and for native troops, 3.68. In the United States, for enlisted men, it was 6.28; in Europe 6.08, and it was low in the tropics. For the white troops the death rate for these two pneumonias was 4.89, and for the colored, 15.81. The total number of pneumonia cases occurring among the white troops in the United States and Europe,

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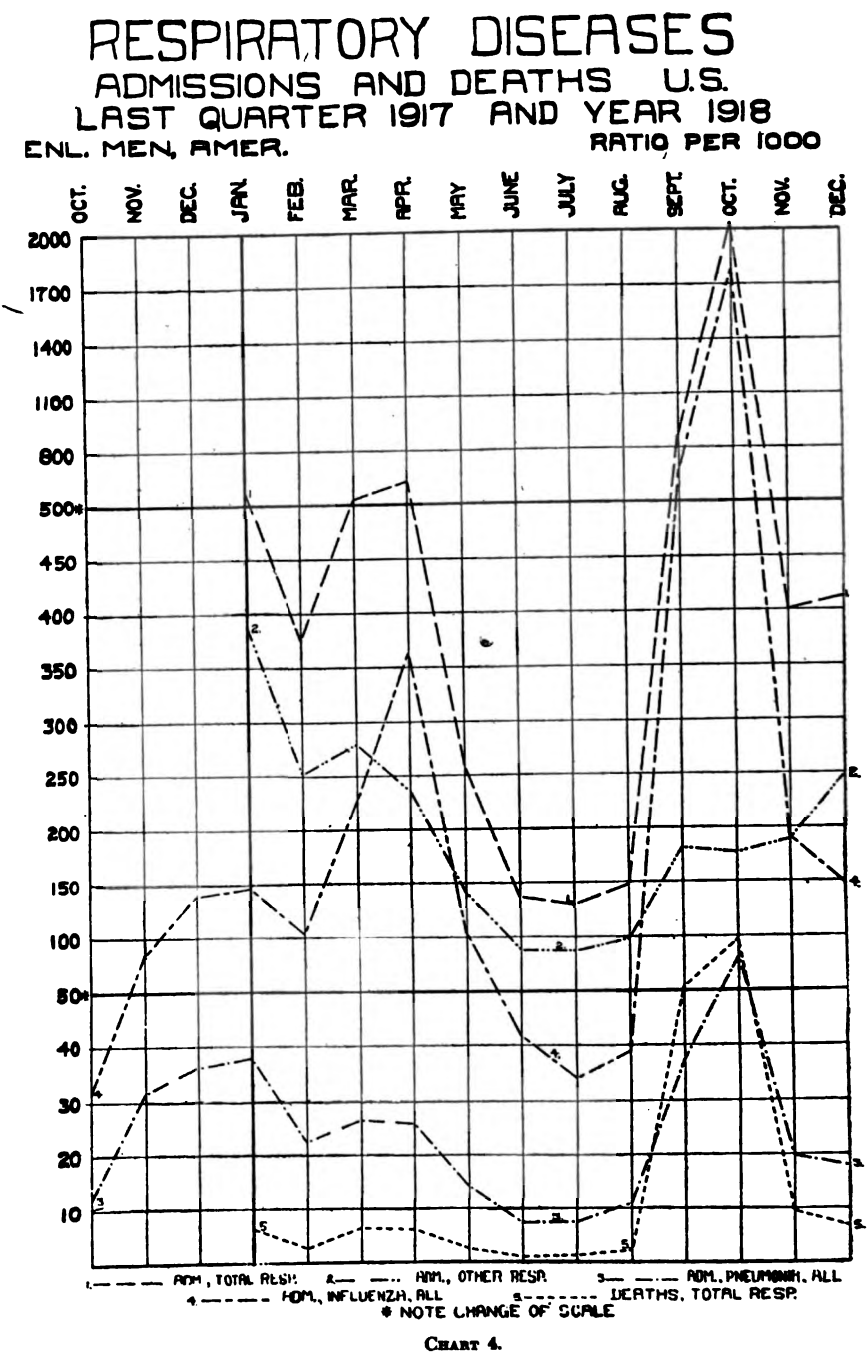

CHART 4.

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RESPIRATORY DISEASES
ADMISSIONS AND DEATHS
EUROPE 1918

ENL. MEN, AMER. RATIO PER 1000

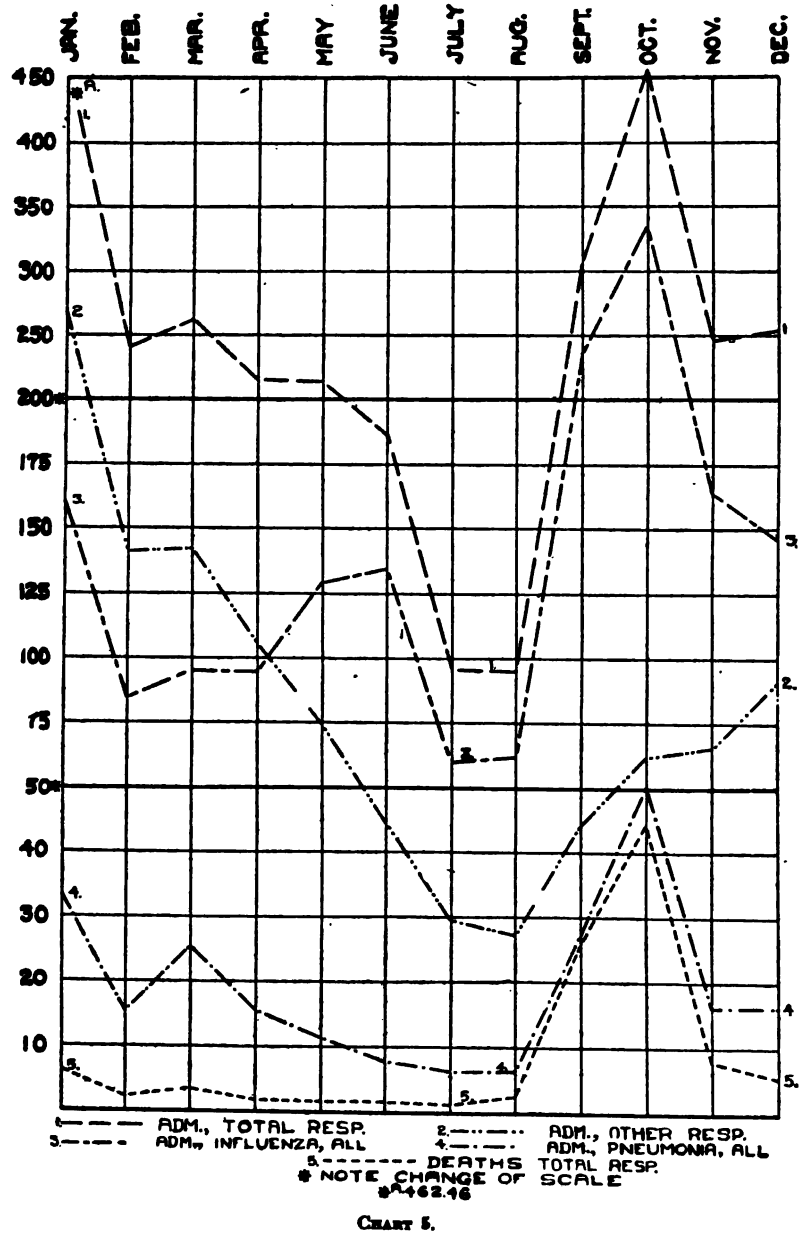

CHART 5.

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counting the cases complicating measles and influenza, was 94,505 with 28,969 deaths. Among the colored troops, enlisted men, there were 19,319 cases, with 4,720 deaths. The incidence rate for the white troops was 44.11 and, for the colored, 115.28. The death rate for the white was 13.52, and, for the colored, 28.17. The case mortality for primary and secondary pneumonia for the white was 30.6 per cent and for the colored 24.4 per cent; for primary pneumonia for the whites it was 26.4 and for the colored 21.6 per cent. It is apparent, then, that the colored race has an incidence rate nearly three times as high as that for the white, a death rate nearly twice as high, but a case mortality rate about 20 per cent lower for all pneumonia, both primary and secondary.

TABLE VI.—*Influenza (All) with Principal Complications, United States and Europe Combined Admissions,* Deaths* and Case Mortality, 1918. White and Colored, Enlisted Men Only, Absolute Numbers.*

(Ratios per 1,000 and Percentage)

ADMISSIONS

	White, 2,142,336		Colored, 167,586		Color not stated, no strength		Average annual, 2,309,922	
	No.	Ratio	No.	Ratio	No.	Ratio	No.	Ratio
Influenza uncomp.	494,947	231.03	40,918	244.16	19,007	.....	554,872	240.21
Influenza and broncho-pneumonia	37,820	17.65	4,006	23.91	204	.....	42,030	18.20
Influenza and lobar-pneu.	15,205	7.10	2,659	15.87	251	.....	18,115	7.84
Influenza and others	22,644	10.57	2,381	14.21	375	.....	25,400	11.00
Grand total	570,616	266.35	49,964	298.14	19,837	.....	640,417	277.25

DEATHS

Influenza uncomp.	568	.27	69	.41	321	.....	958	.41
Influenza and broncho-pneumonia	11,736	5.48	1,253	7.48	110	.....	13,099	5.67
Influenza and lobar-pneu.	5,967	2.79	725	4.33	204	.....	6,896	2.99
Influenza and others	732	.34	94	.56	42	.....	868	.38
Grand total	19,003	8.87	2,141	12.78	677	.....	21,821	9.45

CASE MORTALITY (percentage obtained by dividing deaths by admissions)

Influenza uncomp.	.....	.11	.....	.17	.....	1.69	.....	.17
Influenza and broncho-pneumonia	.....	31.03	.....	31.28	.....	53.92	.....	31.16
Influenza and lobar-pneu.	.....	39.24	.....	27.26	.....	81.27	.....	38.07
Influenza and others	.....	3.23	.....	3.95	.....	11.20	.....	3.42
Grand total	.....	3.33	.....	4.29	.....	3.41	.....	3.41

* In the United States where the strength for the white and colored was obtained, the admission rate for the white troops was 361.43 and for the colored 354.07. The death rate for the white troops was 11.73 and for the colored 15.19. In Europe, where the strength was estimated, the admission rate for white troops was 143.91 and for the colored 206.12. The death rate for the white troops was 5.18 and for the colored 8.58.

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TABLE VII.—*Pneumonia (All) Primary and Secondary, United States and Europe Combined. Admissions, Deaths and Case Mortality, 1918. White and Colored Troops, Enlisted Men Only. Absolute Numbers.*

(Ratios per 1,000 and percentage.)

ADMISSIONS

	White, 2,142,336		Colored, 167,586		Color not stated, no strength		Average annual, 2,309,922	
	No.	Ratio	No.	Ratio	No.	Ratio	No.	Ratio
Broncho-pneumonia and unc.-pneumonia:								
Primary	18,157	8.47	3,654	21.81	1,696	.....	23,507	10.18
With influenza	37,820	17.65	4,006	23.91	204	.....	42,030	18.20
With measles	1,268	.59	158	.94	13	.....	1,439	.62
Total	57,245	26.72	7,818	46.66	1,913	.....	66,976	29.00
Lobar-pneumonia:								
Primary	21,714	10.14	8,789	52.45	843	.....	31,346	13.57
With influenza	15,205	7.10	2,659	15.87	251	.....	18,115	7.84
With measles	341	.16	53	.32	4	.....	398	.17
Total	37,260	17.39	11,501	68.64	1,098	.....	49,859	21.58
Grand total	94,505	44.11	19,319	115.28	3,011	.....	116,835	50.58

DEATHS

Broncho-pneumonia and unc.-pneumonia:								
Primary	5,036	2.35	859	5.13	1,046	.....	6,941	3.01
With influenza	11,736	5.48	1,253	7.48	110	.....	13,099	5.67
With measles	572	.27	43	.26	11	.....	626	.27
Total	17,344	8.10	2,155	12.86	1,167	.....	20,666	8.95
Lobar-pneumonia:								
Primary	5,497	2.57	1,824	10.89	479	.....	7,800	3.38
With influenza	5,967	2.79	725	4.33	204	.....	6,896	2.99
With measles	161	.08	16	.10	2	.....	179	.08
Total	11,625	5.43	2,565	15.31	685	.....	14,875	6.44
Grand total	28,969	13.52	4,720	28.17	1,852	.....	35,541	15.39

CASE MORTALITY (percentage obtained by dividing deaths by admissions)

Broncho-pneumonia and unc.-pneumonia:								
Primary	.....	27.74	.....	23.51	.....	61.67	.....	29.53
With influenza	.....	31.03	.....	31.28	.....	53.92	.....	31.16
With measles	.....	45.11	.....	27.22	.....	84.62	.....	43.50
Total	.....	30.30	.....	27.56	.....	61.00	.....	30.86
Lobar-pneumonia:								
Primary	.....	25.32	.....	20.75	.....	56.82	.....	24.88
With influenza	.....	39.24	.....	27.26	.....	81.27	.....	38.07
With measles	.....	47.21	.....	30.19	.....	50.00	.....	44.97
Total	.....	31.20	.....	22.30	.....	62.38	.....	29.83
Grand total	.....	30.65	.....	24.43	.....	61.51	.....	30.42

The nativity rates for influenza, pneumonia and the common types of acute respiratory diseases show that it is the rural states, especially of the south, that stand at the head of the list, and that the states of the

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INFLUENZA AND PNEUMONIAS 1918.

WHITE AND COLORED U.S. AND EUROPE

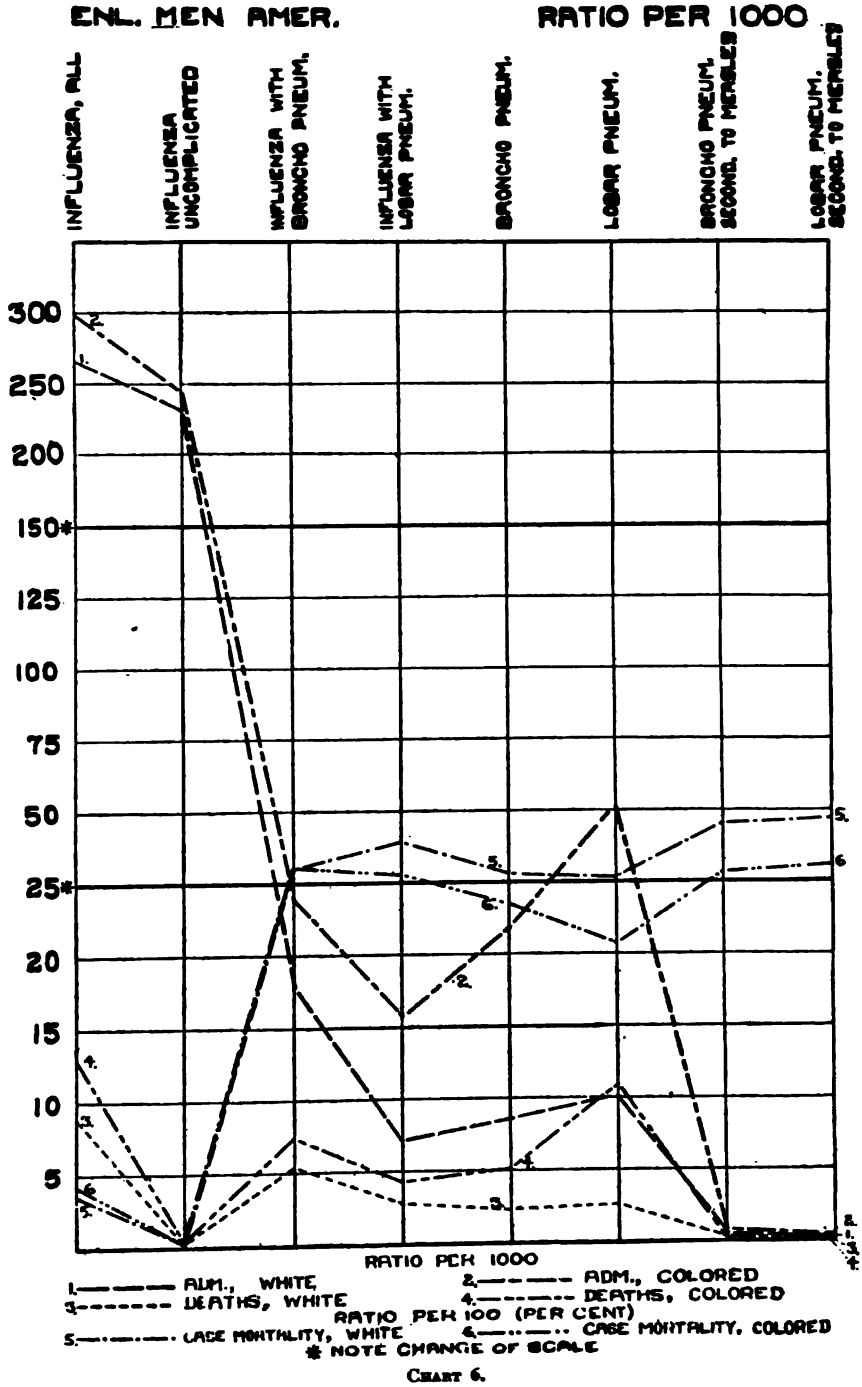

CHART 6.

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north and northwest, whose soldiers seemed to be least susceptible to these diseases, stand at the bottom of the list for uncomplicated influenza and influenza with the two pneumonias. The eastern states stand next above the states of the west and northwest, with the states of the middle west in middle position.

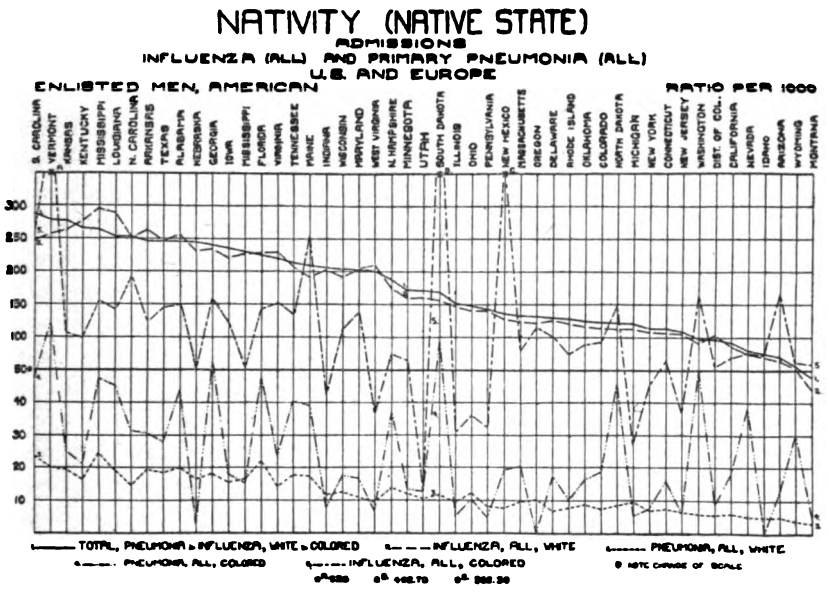

CHART 7.

Considering only the southern states, the nativity rate for influenza for the white was 247.11 and, for the colored 154.58. For lobar-pneumonia it was 10.77 for the white and 28.31 for the colored; for broncho-pneumonia and unclassified pneumonia 7.26 for the whites and 11.43 for the colored. It seems probable that the negro is less susceptible to influenza than the southern whites, but that he is much more susceptible to pneumonic infections, either primary or secondary. The case mortality for influenza and its complications in the United States and Europe in 1918 for the colored was 4.3; for the white, 3.3. The apparent reason for the higher case mortality for influenza for the colored as compared with the whites is probably to be attributed to the fact that secondary pneumonia developed in a much larger percentage of the cases for the colored.

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TABLE VIII.—*Nativity (Native State) Admission Rates for Primary Pneumonia (All) Influenza (All) with the Total for Both White and Colored. Enlisted Men American Troops, United States and Europe*, 1918.

Ratio per 1,000

States	Total pneu. (primary) and influenza (all), white and colored ratio	White		Colored	
		Influenza (all), ratio	Pneumonia (all), ratio	Influenza (all), ratio	Pneumonia (all), ratio
South Carolina	288.32	247.04	23.69	259.08	47.52
Vermont	278.17	257.23	20.02	520.00	120.00
Kansas	277.21	263.21	19.40	107.03	25.02
Kentucky	265.65	276.66	16.43	99.15	21.33
Mississippi	264.74	295.89	24.44	153.67	47.42
Louisiana	253.36	289.23	19.11	142.67	45.27
North Carolina	253.35	252.15	14.69	189.55	31.70
Arkansas	246.05	264.07	19.41	124.46	30.78
Texas	245.79	246.62	18.44	143.59	28.09
Alabama	245.19	257.06	19.99	148.95	43.95
Nebraska	244.63	230.91	16.48	56.83	3.08
Georgia	241.02	233.99	18.16	158.38	60.81
Iowa	235.24	220.81	15.49	124.15	18.02
Missouri	230.24	227.06	16.50	53.88	15.28
Florida	225.09	228.29	22.03	141.35	47.80
Virginia	220.06	229.87	14.22	151.07	23.69
Tennessee	218.67	207.89	17.93	135.76	40.64
Maine	209.27	191.61	17.47	254.91	39.22
Indiana	206.28	202.49	11.76	43.05	7.75
Wisconsin	204.22	191.93	12.48	114.54	17.62
Maryland	202.75	204.85	10.99	137.45	16.79
West Virginia	201.49	210.73	9.46	86.58	6.82
New Hampshire	188.57	174.87	13.84	74.07	37.04
Utah	171.44	161.62	10.53	12.82	12.82
Minnesota	171.58	160.04	12.06	65.51	13.49
South Dakota	169.14	156.61	11.60	492.07	95.24
Illinois	151.81	146.77	9.50	30.84	5.06
Ohio	148.38	140.60	12.31	36.11	10.15
Pennsylvania	142.92	140.90	8.24	32.65	4.93
New Mexico	136.45	127.70	7.70	365.88	19.23
Massachusetts	132.82	123.53	9.64	79.72	20.56
Oregon	132.29	122.10	10.22	115.94	.....
Delaware	129.93	125.83	6.77	101.81	17.32
Rhode Island	128.27	121.11	7.96	74.58	10.17
Oklahoma	124.52	117.14	8.85	89.11	16.96
Colorado	122.56	114.84	7.53	93.17	18.64
North Dakota	122.16	113.38	8.52	147.74	45.46
Michigan	120.58	112.70	9.56	27.16	5.35
New York	113.95	108.14	6.96	45.18	7.48
Connecticut	113.93	107.07	7.51	64.91	15.71
New Jersey	108.44	105.25	6.57	37.08	6.28
Washington	98.09	91.60	5.91	164.77	51.13
District of Columbia	97.28	104.66	5.70	56.15	8.87
California	92.63	86.64	6.02	69.73	18.24
Nevada	80.57	75.01	5.17	76.92	38.46
Idaho	75.28	70.37	4.94	72.92	.....
Arizona	70.94	65.03	5.05	166.66	12.82
Wyoming	57.68	53.51	3.86	62.50	31.25
Montana	47.82	44.44	3.28	59.72	4.98
Alaska	46.09	41.43	3.33	400.00	200.00

NOTE: Recent immigration to the newer states of the west and northwest causes the induction figures to be too high and renders the nativity rates for those states unreliable. The induction figures were used as the divisors. The rates for the colored troops for other than southern states are probably unreliable due to the small strength and small number of cases.

SUMMARY

1. Influenza prevailed much more extensively in the Army in 1917 and during the early months of 1918 than has been commonly recognized. There were 40,512 cases of this disease reported in the Army for the year 1917.

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2. Unrecognized influenza was probably the primary and underlying cause of many of the atypical and fatal pneumonic infections occurring in the army camps during 1917 and the early months of 1918, in addition to the cases known to have been associated with measles.

3. Influenza in 1917 and the early months of 1918 was relatively mild in type as compared with the virulent type of the disease which appeared in army camps in September, 1918.

4. The extension of the virulent influenza from Camp Devens to other camps south and west in September, 1918, can be traced in many instances directly to the interchange of military personnel from infected to non-infected camps. The contagion was transferred by persons either themselves infected or who were carriers of the disease, and the extension definitely followed ordinary lines of travel.

5. The height of the September outbreak of the disease in the United States extended over a period of about nine weeks (September 13 to November 15, 1918). During this period over 20,000 deaths occurred among troops in the United States alone in excess of the number that would have occurred if the disease death rate for the corresponding period of the preceding year had prevailed.

6. The height of the epidemic in France extended over the same period of time as in the United States.

7. Influenza and pneumonia were less prevalent and less fatal among our troops in France than in the United States.

8. The "cantonment" group of stations gave a much higher death rate from influenza and its complication than other groups. (Tent camps or permanent posts.)

9. For the entire Army (approximately 3,500,000 men) there were 688,869 admissions charged to influenza for the year, or 20 per cent of the command. This record does not represent the full incidence of the disease during this period.

10. There were 47,384 deaths from all diseases for the year 1918, of which 23,007 were attributed to influenza. In addition, 16,364 were due to pneumonic infections, bronchitis and pleurisy, many of which, it is certain, should have been charged to influenza, making a total of 39,371 due to acute respiratory diseases, or 82 per cent of the total deaths from disease for the year. Influenza with its complications is charged with 48.5 per cent of the total deaths from disease for the year.

11. Influenza was more prevalent among white troops than among colored.

12. White soldiers from the south had much higher admission and death rates for influenza, penumonia and other acute respiratory diseases than white soldiers from other sections. The lowest rates for these

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diseases were among white soldiers from the Pacific coast and Rocky Mountain states.

13. The negroes stationed in the United States had lower admission rates for influenza than the whites for the country at large, and much lower for these diseases than the whites from the south.

14. The incidence rate for all forms of pneumonia, both primary and secondary, was nearly three times as high for the colored as for the whites for the entire country.

15. The death rate for all pneumonic infections was more than twice as high for colored troops as for the whites.

16. The case mortality for all pneumonia infections for the colored was about 20 per cent lower than for the whites.

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THE FOUNDING OF THIS ASSOCIATION, AND ITS FOUNDER, AS I KNEW HIM. AN ANECDOTAL SKETCH OF PROFESSOR, DOCTOR NICHOLAS SENN[1]

By Dr. HORACE M. BROWN

AT THE time I attended the meeting of this Association in October of last year, at St. Louis, I was much surprised to find that a number of gentlemen wearing the uniform of colonel and lieutenant colonel in the Medical Corps of the Army, and gentlemen of the Navy, upon whose sleeves and shoulders I saw the insignia of the rank of captain, lieutenant commander and commander, when I told them that I had been one of the founders of this society, looked upon me with astonishment; and I did not realize until then that almost two generations of men had grown into years of great responsibility since the time of which I shall speak.

When I was called upon by Colonel Church, asking me to write a paper for this session, being addressed by him as one of the "first inhabitants," I felt assured that while I had not yet reached the age of which Folengo writes when he describes the old Mantuan, Tognasse, as "coughing out the oysters in front and pushing out the shells behind," yet I thought that in the choice of a subject for a paper I could not go far wrong if I described to this new generation the main conditions under which surgery was practiced at about the time this society was founded.

Therefore I have taken as a title for my paper, "The Founding of this Association and Its Founder as I knew Him." An anecdotal sketch of Professor Nicholas Senn.

This is not to be a scientific paper. You will have had enough of that sort of thing before the session is completed. Rather will it be an attempt to tell you something about the origin of this Association and also to give you some recollections of the man who, seeing the need of an improvement in the medical service of the National Guard of the various states of the Union, founded it and fostered it until it was able to stand alone. I refer to the founder of the Association—Professor, Doctor Nicholas Senn of Milwaukee and Chicago.

First: I will give a short sketch of his life and then a few anecdotes to illustrate the character of the man.

Dr. Nicholas Senn was born in the village of Buchs, Canton of St.

[1] Read at the meeting of the Association of Military Surgeons of the United States, at New Orleans, La., April 22-24, 1920.

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Gall, Switzerland, October 31, 1844. He came to America with his parents in 1852 and grew up in the village just at the cross-roads of Ashford, Wis. He attended the local school, graduating from the Fond du Lac high school at the age of twenty. His opportunities for earlier schooling were limited by the need for his labor with his father in the support of a somewhat large family. He taught school for a number of years, at the same time studying the rudiments of medicine under the preceptorship of Dr. Emanuel Munk, at Fond du Lac. In 1865 he entered the Chicago Medical College, and, working his way, graduated from that institution in 1868. In 1869 he married and commenced practice in Ashford. After a period of five years—namely in 1874—he came to Milwaukee, where he developed a phenomenal practice and a great reputation as a surgeon. Between the years 1874 and 1893 his activities in surgery and in investigative work, as well as in developing the hospital conditions in Milwaukee, made his name famous not only in America but in Europe as well.

In 1884 he began his career as Professor of Surgery in Chicago at the College of Physicians and Surgeons, living in Milwaukee and going to Chicago for the performance of his clinical work and the delivery of his lectures. In 1888 he was made Professor of the Principles of Surgery at Rush Medical College, and, in 1891, Professor of Clinical Surgery. He likewise taught military surgery at Northwestern University and at the Chicago Polyclinic.

Nicholas Senn was a born teacher, a good speaker, possessed of a marvelous memory for detail and a capacity for illustration of his subject that is as rare as it is essential to success for a teacher. He was a brilliant operator, in plastic surgery almost unequalled for his time. As he grew older, his tendency toward too great daring was succeeded by a well-considered conservatism and a more rigidly exact technique based upon careful experiment and observation.

In 1888 he was made Surgeon General of Wisconsin, which position he held until he left that State to reside in Chicago. In 1892, Governor Altgelt commissioned him Surgeon General of Illinois, and it was while in these state appointments that he realized the great need for improvement in the character and efficiency in the medical staff of the National Guard of the country. It was in the spring of 1891 that he first conceived the idea of the organization of a National Association of the surgeons of the National Guard, and it was in September of that year when, after having discussed the idea with representative National Guard surgeons and with the men at the head of the Medical Departments of the Army and Navy at Washington, he called together about thirty of the surgeons of the National Guard of the various states at

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Chicago and with their concurrence put into organized form "The Association of Military Surgeons of the National Guard," the original organization, of which this association is the development.

At the outbreak of the Spanish-American War he took charge of the camp at Springfield, Ill., and on May 13, 1898, being commissioned lieutenant colonel and chief surgeon, U. S. V., he was assigned to duty with the Sixth Army Corps, being on duty at Chickamauga Park and in general charge of the Leiter Hospital.

In July, 1898, he went to Santiago, Cuba, with the expedition under command of Brig. Gen. Guy V. Henry, being on duty with the Army of Invasion as "Chief Operating Surgeon in the Field." He later served on board the U. S. hospital ship *Relief*. He resigned September 6 and was honorably discharged September 17, 1898.

Nicholas Senn was a most prolific writer. He traveled much, and each new journey was an inspiration for new products from his pen, ranging from speculations upon the politics and policy of foreign governments to descriptions of the flora and fauna, or the activities of the surgeons of the land last visited by him. His text-books—although with the development of surgery in the past twenty years, now out of date—for their time, exhibit the great capacity of the author for assimilation of knowledge, a wonderful capacity for observation and facility for communication of that knowledge to his readers and students.

He earned much money and gave with a liberal hand. He endowed rooms and beds in a number of hospitals, presented the Senn Clinical building to Rush Medical College, spent lavishly of his means for the extension of medical education, for the founding and maintenance of scientific societies, was a collector of books, and always a persistent student of all and everything that pertained to the profession which he so highly ornamented.

He purchased the great collection of books belonging to Professor Baum of Gottingen, and that of Dubois-Reymond of Paris, presenting them to the Newberry Library, from which library they passed to the Senn department of the great Crerar Library of Chicago.

A close observer, an intellectual giant, nothing was too small or too great to have an interest for him, and his unusual memory made all that he saw or learned of immediate availability at any time, and all that he knew was always at the service of those who knew and understood him. Unassuming, always an encourager of young men, capable of untiring effort, and a great judge of character, a perpetual worker, and endowed with vast ambition; he looked with scorn upon frivolity and laziness in those about him. Giving himself no rest in the pursuit of his own ambitions, he had no patience with the lack of these qualities in others.

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With a mind capable of protean activities, he had the faculty of enlisting others with absorbing interest in his projects and adventures in investigation along surgical lines and in stimulating equal enthusiasms in all with whom he came in contact.

I never knew a man capable of such continued and untiring effort, nor one capable of such condensation of thought and energy toward the accomplishment of his ambitions, but he, like all other men of his mental characteristics, never reached a final goal, for with the approaching accomplishment of every one of his efforts, a new goal was ever before him, and ever in view a new problem to conquer and solve.

He was always at work, and in the midst of work for the satisfaction of a new ambition, death from myocarditis came upon him. He died on January 2, 1908, at the age of 64 years.

He was a great surgeon, a great organizer, a great teacher, a good linguist, a fine scholar, a clever botanist, a lover of beautiful things. Careless of his own person, he demanded care and neatness in others. Unpitying in his own treatment of himself, he was a fond and indulgent husband and father. To his intimates in the profession somewhat of a martinet, to his students and colleagues he was hospitable, helpful and kind, an inspiration toward perfection, and an impulse toward that studious labor which alone brings success in this profession of ours. Such was the man who founded this Association. To have been the moving spirit, the activating impulse that found its fruition in the development of this great and important organization was something in the world, something important to the country as well as to the individuals that compose the organization, and to have had the vision and the energy to make that vision a reality was to my mind an evidence of greatness of character and ability.

I have attempted to make a census of the sixty-three men who became members in Chicago on September 17, 1891, to try to learn how many of that group of men are still alive. I am not certain, but it is probable that but thirteen of the sixty-three are still living. In the course of twenty-nine years fifty of them have gone to their long rest, and, strangely enough, of the thirteen remaining men three are Wisconsin men. Whom the gods love die young.

While Senn boasted that he was never able to sit out any sort of musical entertainment, he nevertheless knew very well how to get all hearts among medical men attuned to his theme, and accordingly, upon that important evening of September 17, 1891, he gathered his guests from all parts of the United States together at a dinner at the Leland Hotel in Chicago and after the coffee and cigars were served, and after there had been opportunity for acquaintances to be made among the

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guests, he announced the purpose of the gathering and his reasons for believing that such a purpose was well worth supporting not only for the improvement of the medical service of the National Guard, but as well for the uplifting of the professional standards of the men who were giving their time and enthusiasm to the country in their capacity as medical attendants upon the state soldiery.

The idea was received with enthusiasm, and, in the customary form, committees were appointed for working out the details. There were thirty-five men present at this dinner, of whom, so far as I can learn, but ten are still living.

The following day, at about nine o'clock, the entire party met at Rush Medical College and were entertained at a clinic by Dr. Senn, after which they dined at the Union Club, attended a meeting at the Chicago Polyclinic, and in the evening enjoyed a reception at the residence of Dr. Senn on Dearborn Avenue.

That afternoon at the Polyclinic, the organization of the Association of Military Surgeons of the National Guard was completed, and the infant that on that day had its birth was the child that was ultimately to mature into the strong manhood that is evidenced in this present organization.

I hesitate to approach the anecdotal portion of what I have thought might entertain you, for the reason that it is impossible for me to know whether or not you may be interested in the things that were happening in the surgical world at the period immediately following the announcement of the Listerian theory; the "Antiseptic" period of surgery, just succeeding the time when students and admiring surgeons were sitting in the amphitheater of Bellevue Hospital, seeing Prof. Jimmie Wood come in, take off his coat, roll up his sleeves, and, putting on an apron of rubber cloth to keep his trousers and white vest from getting bloody, do a hip-joint amputation with unwashed hands and unwashed instruments. What was the use of washing his hands; they would be bloody in a few minutes?

The period from the year 1881 until 1889 was the time during which I was most closely in touch with Dr. Senn, and had a part—with many others—in his struggle (a struggle which was taking place in all parts of the civilized world) toward the perfection of a technique that should develop antiseptic or aseptic methods to the result that operative work without infection of wounds might be possible.

It was in 1881 that, through the efforts of Senn, the new Milwaukee Hospital was established, and in it were combined all the most modern ideas of that time in regard to the carrying out of antiseptic surgery.

The operating room, facing south, had an asphalt floor. Of course

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the hot sunshine through the many windows softened this, the casters on the legs of the wooden operating table sank into it, and when the asphalt again hardened the table could not be moved. There was one enameled iron sink with hot and cold water, and bracketed shelves were attached to the walls, upon which might be placed apparatus for the spraying of hot carbolic solution into all parts of the room. About the patient would be posted two or three student assistants holding similar steam carbolic spray atomizers, directed toward the field of operation, while the operator, Dr. Senn (perhaps having washed his hands before beginning the operation, perhaps not), in his ordinary clothes, his shirt sleeves rolled up to his elbows, and his abdomen and front adorned with a rubber apron, with Dr. William Mackie and me, his assistants, in similar costume, in the midst of the mist and odoriferous fog, endeavored to "accomplish our hellish purpose." The admiring gallery of onlookers could be dimly seen through the haze, hanging in trance-like admiration over the operating field, with the sweat from their unwashed beards and faces dripping into the opened abdomen or other wound.

Of course within a short time we were all suffering from melanuria, and the patients failed to respond with the desired unanimity to the expectation of union of wounds by first intention; nevertheless, for a short time we were satisfied that the fault lay not with the method and technique but with the individual propensity of the patients. However, it soon became manifest that there was a grave error in the principle involved, and the spray was quickly abandoned and a feverish and enthusiastic madness of investigation began as to how to eliminate the factors that were mitigating against success.

It was clear that the carbolic spray did not prevent sepsis. It was also clear that germs must enter the wounds, and probably from the hands of the operators. I believe that Dr. Senn was the first operator to use gloves—cotton gloves boiled before use—in operating.

At once there was an almost startling improvement in results in his cases. Next he began to insist that the "gallery" should not approach the patient. Again improvement in the results. Then began an effort at bacteriological examination of the skin of the patients and the hands of operator and assistants, and then of salivary spray from the mouths of those about the operating table. With each new experiment improved end results were obtained, so that within a year we were, in a way, carrying out all the precautions at the operating table now employed by surgeons—at least theoretically—and our results were good.

With the coming of that state of affairs, Senn was quick to see what might be hoped for in the invasion of new and previously almost untouched fields of surgical invasion, and then began that long series of

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experiments in surgery of the joints, bone implantation, brain invasion, attempts at arterial grafting and nerve implantation which—while in many instances failing—nevertheless were some of the steps that have led to the present high position of surgical, almost exact, knowledge, and which in plastic surgery of the abdominal contents resulted in the development of a technique for gastroenterostomy and the whole series of operations upon the pyloric end of the stomach, gall-bladder and intestines, which today are matters of everyday occurrence. I well remember an operation preformed by myself on the second day of February, 1882, for a ruptured appendix, done under our very imperfect methods of aseptic procedure, which was entirely successful. I have since been informed that this was probably the first purposeful appendectomy ever performed.

I am by no means sure that this is true, and it is a matter of small importance anyway. There were about ten or twelve of us younger men engaged in all sorts of experimental efforts in plastic surgery within the abdomen, and it was at this time that a vast number of materials were used as intra-intestinal splints, ranging from indigestible substances like the barrels of hard rubber syringes, glass tubes, various kinds of buttons, these being introduced into the stomach to endeavor to find out how large a foreign body would find its way through the pylorus and the ileocecal valve, the object being to endeavor to discover some material which would serve as a splint within the intestine, upon which to develop the means for suturing the bowel in end to end and also in lateral anastomoses. I am now well aware that such things had been used with similar objects in view by the medieval surgeons, and that the men of that time had also used animal fibers for the purpose of suturing the bowels, but at the time of which I am writing I am sure that none of us were aware of those matters, and so far as we were concerned the work was original with us.

We found that any body that would pass through the pylorus would safely find its way through the ileocecal valve, and this fact being established, there began a slaughtering of dogs, and sheep, and cats, and rabbits in dozens of experiments, in developing a technique for intestinal anastomosis.

At last Senn suggested that decalcified bone might be used to make buttons, which being placed within the two parts of the bowel to be joined, might serve as anchors upon which to complete anastomosis of the parts. I cannot attempt to tell you the number of different digestible substances that were experimented with before the bone-plate operation of Senn became a success and was the foundation upon which Murphy of Chicago developed his metallic button.

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You must remember that, at the time of which I am speaking, intestinal surgery had advanced but little upon the method used by Albucasis, which was to gather up protruding loops of intestine in case of wounds of the abdominal walls and, ligating them about, to cut off the extruding part, leaving, of course, if the patient recovered, an intestinal fistula; or the time in 1316 when Mondinus recommended that, in case the intestine should be punctured, the wound margins were to be drawn together by taking large ants by their bodies and letting them by means of their nippers, one in each margin of the gut, pull the edges together and then break the bodies of the ants away from their heads.

Up to the time of the development of this aseptic form of surgery the knee joint was a *nolo me tangere*. It was opened with prayer and closed with thanksgiving, and if the patient recovered it was considered a miracle. The abdomen was a portion of the body equally dangerous of invasion, but already in 1883 Senn was invading both the knee joint and the abdominal cavity with perfect impunity, and we were getting first-class results from our operations.

It was in 1883, after the removal of a huge multilocular cyst, that Senn stated at the operating table that there was a man named Keyes in London who had dropped the ligated pedicle back into the abdominal cavity instead of attaching it to the abdominal wound. He hesitated for a moment and then dropped the pedicle in his case back into the abdomen. I recall the great anxiety with which the patient was watched for the next few days, in fear as to the result of this step. However, the patient recovered, much to our satisfaction and somewhat to our astonishment.

Let me diverge a moment at this point to emphasize one of the traits of Dr. Senn. He was so sure of himself in regard to his abdominal work that after the patient left the operating table he would seldom see him until forty-eight hours had gone by, when he would enter the room, look at the charts, and if there were no manifest symptoms of sepsis, would ask the one question: "Is the gas passing off from your bowels?" If the nurse or patient would answer "yes" he would say, "qui crepitat vivat" and would go on and not see the patient again until he or she was ready to leave the hospital, so sure was he of the truth of the dictum of Hippocrates which he had quoted.

It was at this time also he began his famous series of experiments in injecting hydrogen gas into the bowels per rectum for the purpose of discovering, if possible, all of the wounds to the intestine that might arise from gunshot injury. It was found that hydrogen gas would not pass readily in a reverse direction through the ileocecal valve, and

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that it was not until the colon and rectum were completely dilated with gas that it would pass into the small intestine and show itself through wounds in the gut made by small shot or buckshot. It was, therefore, necessary that there should be some basis of knowledge as to the capacity of the large intestine for dilatation, and our friends the dog and the sheep and the calf and the cat and the rabbit were again called into service for colonic inflation. And then, unknown to the patients, a series of experiments was begun upon them in the hospital, until it had been proved that the large intestine of the human animal has a capacity of one imperial gallon.

This knowledge once established, it was not difficult to measure the amount of hydrogen gas to be employed or the force that was necessary for inflation of the guts, Senn himself being the first to submit to the experiment. When this conclusion had finally been reached, an amusing incident occurred in Dr. Senn's practice which was quite as serious in its results as it was amusing in its nature. If you will bear with me for a moment, I will repeat to you a rhyme or jingle written by one of the men who was working with Dr. Senn at that time which will describe fully not only the facts of this case, but also will illustrate the profound and abiding faith that Dr. Senn inspired in those about him.

SCIENTIA VINCIT

In the "City of Beer" a student once lived,
In medical wisdom profound;
But of practical skill he had not a jot,
As later on in this tale I'll expound.

And this young man's preceptor, a surgical wight,
Was a man who much had explored
The abdominal space, and through the whole gut
Much hydrogen gas he had poured.

And the young man's chief pride in his preceptor was;
His master in surgery bold;
And he thought it a duty and also a joy
To do what he by him was told.

Now it happened one day that an Irishman came
And complained in a terrified tone,
That his wife was stopped up with an horrible mass.
Her movements were hard as a stone.

The surgeon, he ordered some Comp'. Cath'. pills.
Signa: "Three to be taken at night."
"If the bowels don't move, let me know in the morn,
My student will fix them all right."

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With a miserable air of distress and despair
Came the Irishman early next day,
And said, "Thim pills didn't worrk, and divil a thing
Since I gave them has yet come away."

The surgeon, he turned to his student and said,
"A clyster we'll give her and see
If we cannot succeed in dislodging this mass;
An impaction it surely must be."

"How large an injection shall I give?" asked the lad.
"What! How often must you be told
That the colon from anus to ileac valve
An imperial gallon will hold?"

Our student, surprised at the measurement given,
Simply packed up the syringe and said:
"I'll go with the man and I'll give her the squirt,
For my pride is to do as I'm bade."

When arrived at the house, on a large yellow mug,
Standing out on the floor of hard ground,
With a look of distress on her vixenish face,
A little, weak woman he found.

Said he: "My dear madame, how long is it now
Since a natural movement you've had?"
"Sure, Docther," said she, "'tis tree weeks today,
And the cramps in me stomick is bad."

Then he filled up a basin and measured with care,
Of hot water eight pints to a drop,
And stirred in yellow soap with a prodigal hand,
'Til the foam stood up high on the top.

Then persuaded the woman to lie on her side
On the bed that stood up 'gainst the wall,
And filled up the syringe, and began to inject,
Though the patient in anguish did bawl,

"Holy Mary! Saint Joseph! Sweet Mother of God!
Och, Docther, me insides ye will bust!"
"Be perfectly calm, dear madame," he said:
"On my knowledge you surely may trust.

Your colon and rectum combined will contain,
Of water, four quarts to a dot.
Lie perfectly still, and I soon will be through.
Let's get it all in while it's hot."

"Mea Culpa! Saint Mary! Saint Peter and Paul!
Don't, Docther! I'm full as a sot!
I can't howld any more! Och, darlin', please stop,
Or I'll bust! Let me get on the pot!"

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"It cannot be true that you yet are quite full,
Of the gallon, there yet does remain
A pint and a half, which I will inject,
If your fears you will only restrain."

So the student he pumped, and the woman she screamed,
"Holy Mary, pray for me soul!"
KLSCH—"Don't, Docther! I'm dead!' KLSCH—"pull out the spout!"
KLSCH—at last, nought remains in the bowl.

And science had conquered. In the bowl not a drop
Of the foamy concoction remained,
And the woman, though dead as she lay on the bed,
The whole of the mixture retained;

And the student, he packed up the syringe and left,
And quick to the office he sped,
Told his master: "Your patient has gone on before,
But I put in a gallon," he said.

About this time, also, Dr. Senn found himself deeply interested in cysts of the spleen, and attempted to get together a number of cases of this form of disease of that organ.

You must remember that this was still in the days of laudable pus, before the days of the Roentgen ray, bacterial classification, the discovery of the tubercle bacillus, when scrofula was still scrofula and not tuberculosis; that there was no diphtheria antitoxine, no knowledge of the spirochete pallida, no phagocytosis, no side-chain theory, blood-counts were but an amusement relating to anemia, the sphygmograph was but a toy, and all of the advances in the perfection of knowledge of and in definite classification of diseases were as yet things of the future, and diagnosis was a much finer art than it is today.

Among my patients there appeared a woman with a large tumor in the region of the spleen which gave no distressing symptoms other than it somewhat deformed her appearance. An extremely careful examination of the woman convinced me that I had to deal with a large cyst of the spleen, and with much triumph in my manner I presented the case to Dr. Senn for examination. He was also convinced of the correctness of my diagnosis and called in a number of other medical men for their examination and opinion, and all agreed that the much desired cyst of the spleen had been found, and as I had been the discoverer of the case, I was called upon to operate upon it in the presence of a large gallery of interested medical spectators.

The abdomen was opened and how great was our fall, for, instead of any disease of the spleen whatsoever, the large intestine was found attached to the abdominal wall and contained a huge stercolith with a large hole passing through its center horizontally, through which the

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fecal matter of the bowel was passing from the hepatic flexure into the descending colon. I believe that the first posterior gastroenterostomy for carcinoma of the pylorus that was ever done in this country was done by Dr. Senn early in 1882 upon a gentleman named Quinn. At the time of which I am mentioning, we saw many cases of enormous fibroids and multilocular cysts, a true description of which would not be believed by those who did not live at that time. In these days, such things are operated upon earlier and it seldom occurs that one is called upon to operate for the removal of fibroid of the uterus or a cyst, which when removed weighs as much as the carcass of the patient left behind. But such things were not infrequent at the time of which I am speaking. Lumpjaw was of most common occurrence and interested Senn greatly. I know of no operator who has ever gone as far in an attempt to enucleate actinomycosis extending into the mediastinum and about the great vessels, as Senn.

To illustrate one of the characteristics of the man about whom I am speaking—that is, his capacity for concentration of thought upon the particular line of investigation which he might be following at any time—it happened one day, at the time when he was carrying on his experiments with ligation of blood vessels in continuity, that I was riding with him from his office to the Milwaukee Hospital. He had an old horse that he called Charlie. We were sitting in his buggy, he talking earnestly about the problems in relation to ligation of arteries. We turned into the driveway of the hospital and began climbing up its steep grade. When we were about half way up the horse dropped dead, and Senn, without for a moment breaking the thread of his discourse upon what he was doing, stepped out of the buggy, did not even look at the horse, and with me by his side climbed up the rest of the incline, opened the hospital door and walked in, and was almost at the operating room before it occurred to him that anything unusual had happened.

It was my privilege to have crossed the ocean with him a number of times, and on his ocean voyages his habit was to work at least eight, sometimes ten hours a day at his writing.

At some time in his career he had gone to the little town of Mayville, in Wisconsin, and there by chance had bought some cigars of a small local cigar maker. What they were made of I never was quite able to understand, but he found them to be perfection and entirely to satisfy his taste. Whenever he went to Europe he would order boxes of them to be sent to the various cities that he expected to visit, and he would give himself much trouble and go to great expense in paying duty upon this tobacco, although to the taste of the average smoker the contents of the box were never worth the value of the label.

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Aboard ship he would go into the smoking room with a pile of manuscript and a lot of blank paper and a box of these cigars. Unmindful of all the noise from the card tables, from the drinkers, from the betters among the passengers, so deeply immersed in what he was thinking and doing that he was absolutely unconscious of anything about him, he would sit for hours smoking his Mayville cigars and writing and piling up additional leaves of his manuscript.

At four in the afternoon he would go out to his chair on deck, sleep for an hour and return to the smoking room, continue his writing—often going without his dinner—until a late hour of the night.

Shortly after the perfecting of his bone-plate operation upon the intestine, he went to St. Petersburg to the International Medical Congress. Professor Reverdin of Geneva had written to him asking him to come to Geneva to demonstrate the operation. Senn was unable to go and sent me in his place. This, I thought, was one of the greatest privileges of my life, for at that time Kocher and Reverdin and a number of the surgeons of Switzerland were carrying on their epoch-making investigations into the functions of the thyroid and were developing the technique of thyroidectomy, and it was my privilege, after having demonstrated the bone-plate anastymosis upon a sheep in the amphitheater in Geneva, to spend about three weeks with these men and thus through Dr. Senn to know them well and to have had an early advantage in understanding the problems that they were solving.

Senn was one of the earliest men to conceive the idea of bone transplantation and to emphasize the need for early mobilization of the knee joint after resection. I have brought with me here today a pair of the bone plates such as were used by Senn in 1882, and you will readily understand how, when they were passed into the two portions of the intestine that were to be anastymosed, they would perfectly serve their purpose as splints. Of course we now know that they were unnecessary, but without them as a splint for the support of the intestine in the early days of this investigation, I doubt if we would ever have reached our present perfection in that form of plastic abdominal surgery.

I have said that Senn was an organizer and teacher. A teacher is born, not made, and the man who feels within him the impulse for teaching necessarily needs someone to teach. Senn had not been in Milwaukee more than a year before he began looking about for an audience. He found that the Medical Society situation in Milwaukee was at the lowest state of decay. The county society had been in a state of desuetude for a long time. He resurrected it, made it over, developed enthusiasm, and in its renewal and increase in membership found an audience which derived great benefit from his teach-

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ings. He also organized the Verein Deutscher Aerzte, a society made up of the German physicians of Milwaukee and a few American born men who had attended classes in German universities. In 1884, for the purpose of teaching and stimulating a desire for knowledge among the younger medical men of Milwaukee, he caused the Milwaukee School of Anatomy and Surgery, a properly incorporated medical school but really organized only for the purpose of making dissection and anatomical investigation easily available, to be developed. It was shortly after this that his fame became so widespread that he was called to Chicago to begin his teaching work there.

Just as Milwaukee student physicians went to Europe to observe and profit from the work of great European surgeons, so many well-known surgeons of the old world came to America and made their pilgrimage to Milwaukee to hear and see what Senn was doing.

I well remember the coming of Von Esmarch with his beautiful wife and the royal entertainment, in which I participated, that Senn offered to this distinguished surgeon. Many of the men prominent in French, Swiss and Spanish medicine came to Milwaukee to visit Senn. Unless I am mistaken, it was at his clinic at the Milwaukee Hospital that I first saw the great Spanish physician, Ramon y Cajal.

Senn's going away from Milwaukee was a tremendous loss to the faculty of that city, but he left behind an influence upon those who had been closest in contact with him that remains today as an inspiration and an impulse to continue his effort toward improvement in all that goes for making men ethically better, more skillful and more worthy of the name of physician.

It is very far from my intention to convey to you that I was singularly prominent in the work that was led and directed by Dr. Senn. Without the skill of Dr. Connell of the County Hospital, the bone plate would never have been a practical thing, and to the efforts of Drs. William Mackie, Bading, McDill, Kaumheimer and the many students who were gathered about Senn at that time, I am sure a great part of the merit for the detail work is to be credited. Mine was but a small part in the prosecution of the investigative and demonstrative labor of the time under consideration.

I could tell you a thousand things of Senn's skill in botany, of his marvelous faculty for grasping the nearest simile with which to illustrate a point in his discourse; many stories of his carelessness of dress; that tremendous power for application which I have known him to exercise to the point of working all day for three successive days and to sit writing in his study the entire two intervening nights without sleep or rest. The fact that when he was in his creative moods he was

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quite unaware as to whether he had changed his clothing, eaten or slept—such was the thrust of his hunger for work and for the satisfaction of his ambitions. He was very familiar with many of the customs of the Indians of northern Wisconsin in regard to their forms of medical treatment. He was deeply interested when in South America in some of the diseases peculiar to Peru. He was very fond of hunting and in that pastime found his greatest relaxation, and although so entirely a student and so complete a slave to his desire for knowledge, yet he was passionately fond of flowers and of beautiful things. In books he took an absorbing interest, as was shown by his benefaction to the Newberry and Crerar libraries in Chicago.

Gentlemen, I hope I have painted a picture of Dr. Senn that will give you at least some idea of the character of the man, especially of the nature of his enthusiasms and his work, and I beg you to note that our gathering together here today is but an evidence that the work of Senn has lived after him. He would be the last, if he were alive, to look for commendation for any of his acts. Much that I have told you is a mere matter of memory and may be inexact, but at least I hope my words will have painted for you a pleasing portrait of a most remarkable man.

If you have found that there have been too many repetitions of the personal pronoun "I" in this paper, I beg your forgiveness and ask your charity for a frequent failing of those who have reached the age when "sans teeth, sans eyes, sans taste, sans everything" their eyes purge "thick amber and plum-tree gum."

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A NOTE ON THE EPIDEMIOLOGY OF INFLUENZA

By Major MILTON W. HALL
Medical Corps, United States Army

(With three illustrations)

THE publication of several articles[1] emphasizing the rôle of the hand in the transmission of respiratory infections, and especially of influenzá, leads to the recording of the following observations that bring out other factors that should be considered in evaluating the relative importance of different means of transmission of infection.

In going over the records of the 1918 epidemic, the writer, while epidemiologist at Camp Jackson, was struck by the widely differing rates of incidence obtaining in two groups of the camp population. These were on the one hand the regiments of the Field Artillery Replacement Depot, the so-called F. A. R. D., and on the other the 56th Field Artillery Brigade. The former group showed a rate higher than that of the camp as a whole, the latter one very much lower. In most respects the two groups lived under the same conditions. They were subject to the same camp rules with regard to the intermingling of troops during the epidemic. Neither group used the mask; neither was sprayed. Both groups were on an easy training schedule to avoid fatigue and were given outdoor recreation to sustain morale. The F. A. R. D. regiments were not quartered in any one section of the camp but practically surrounded the 56th Brigade.

On inquiry of the medical officers in charge at the time it was found that one decided difference existed in the region of the two groups. The messkits of the F. A. R. D., while individually washed, were dipped in two changes of actively boiling water, the cans remaining on the fire during the process. The surgeon of the F. A. R. D., Maj. W. J. Kesterson, states that this regulation was strictly observed during the period of the epidemic. The "old-line method" of washing was used by the 56th Brigade with no attempt to maintain a sterilizing temperature in the water used. The camp surgeon is my authority for the latter statement.

The 56th Brigade, during the period of comparison, had 35 cases of influenza or broncho-pneumonia, a rate of 8.1 per 1,000 on an average strength of 4,300. The F. A. R. D., with 24,600 men, had 5,273 cases or 214 per 1,000 (Table I).

Obviously some factor other than the care of the messkits was responsible for the disparity in the rates, and by analogy with other

[1] Lynch, C., and Cumming, J. G.: Military Surgeon, 1918, 43, No. 6; Cumming, J. G.: *Am. Jour. Pub. Health*, 1919, 9, p. 849.

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respiratory infections we should expect that relative length of service in the two groups might enter into the calculation.

The F. A. R. D. was essentially an organization of newly drafted troops. Its purpose was to supply replacements for artillery organizations with the minimum time spent in training. While exact figures are not available, it can be definitely stated that the average service period for the group was less than three months, while certain regiments were made up of very recent recruits. The 56th Brigade was of more varied origin. Its original nucleus consisted of National Guardsmen from Alabama, Georgia and Florida, most of whom had seen service on the border. To these were added a quota of drafted men in the fall of 1917 and another early in the summer of 1918. Probably two-thirds of its men had seen more than a year's service, and few, if any, less than three months.

There was then in length of service a possible factor, which if active, was sufficient to overcome any advantage accruing to the F. A. R. D. in the superior method of handling messkits. There were moreover decided differences in case rate among the regiments of the F. A. R. D. itself. These regiments had been organized in the order of their numbers, but with trained men leaving for overseas, transfers and reorganizations constantly going on, some of the newer regiments had seen comparatively long service. The newest regiments as a whole at the time of the epidemic were the 7th, 8th and 9th, which had been filled from the latest draft to arrive in camp. These regiments totalled 6,681 men and had 2,548 cases of influenza, or 396 per 1,000. The other F. A. R. D. regiments with 17,931 men had 2,725 cases or 152 per 1,000 (Table II). This difference confirms the supposition that length of service tends to protect against influenza as it does against other better known respiratory infections.

A search of the clinical records at the base hospital showed that of 9,261 cases diagnosed as influenza or broncho-pneumonia during this period only 1,677, or 18 per cent, were credited with more than three months' service, while 7,584, or 82 per cent, had been in the Army less than that time. It again proved impossible to obtain exact figures showing the proportion of recruits in camp during the epidemic. Considering the rate of induction of new men during the summer, the average stay in camp, the very considerable permanent camp personnel, and the trained organizatio..s at the firing center, it is probably not an over-estimate to say that one-half of the camp population had seen service of three months or more. On this basis again it would appear that the recruit is far more susceptible to influenza than is the seasoned soldier.

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An explosive character of outbreak, showing on the daily incidence chart by a sharp rise, high peak and abrupt drop, is regarded by Lynch and Cumming as characteristic of organizations using careless methods of dish-washing. This type of curve is seen in the regiments referred to as having the highest sick rate for the period, while the regiments with a low rate showed a flattened curve with the cases spread

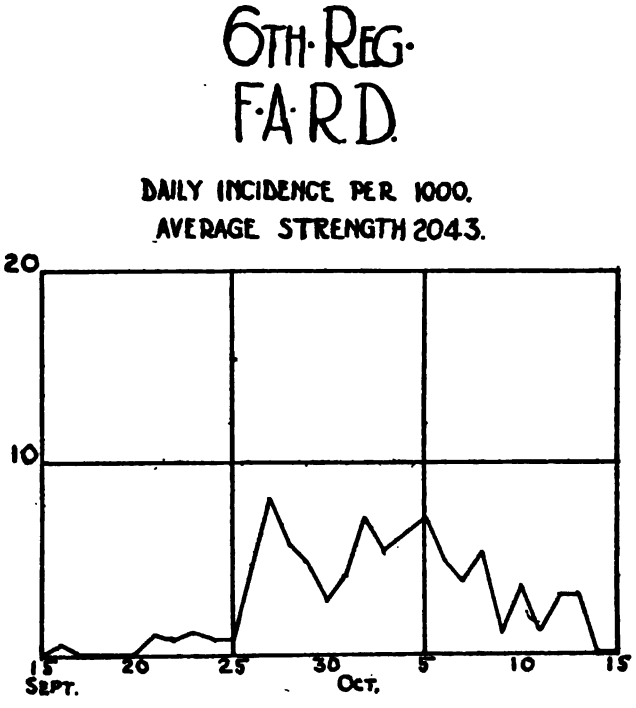

CHART 1.

over more days. The difference is well shown in the curves of the 6th and 7th Regiments of the F. A. R. D., which occupied contiguous areas in the cantonment and were living under identical regulations in every way, but which differed in the large proportion of recruits in the latter. The 6th Regiment (Chart 1), 2,043 strong, had 165 cases, or 83 per 1,000, the incidence extending over 33 days with the highest daily rate 8 per 1,000. The 7th Regiment (Chart 2), with 2,260 men had 915 cases, 398 per 1,000, extending over only 19 days, and a maximum daily rate of 49 per 1,000. These regiments were using exactly the same methods in the handling of their messkits. May it not be that this type of curve characterizes a group of high susceptibility from whatever cause?

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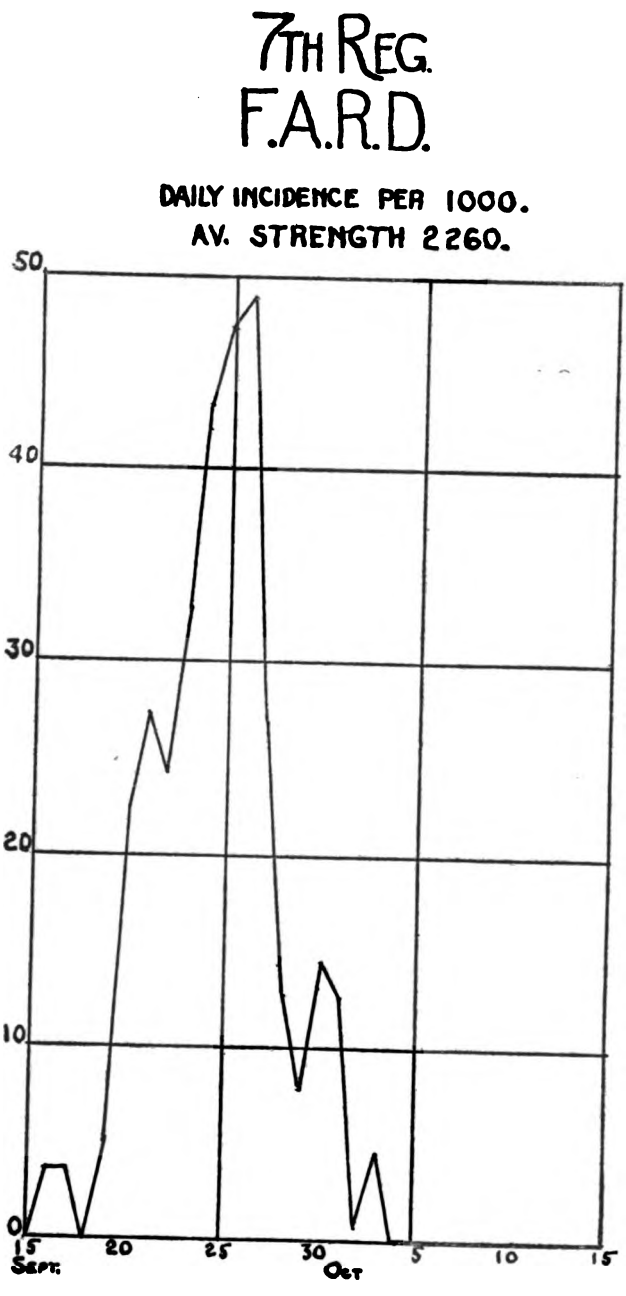

CHART 2.

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In January, 1919, a small return epidemic visited Camp Jackson. This involved first and mainly the 48th Infantry, which had been at Camp Sevier during the autumn outbreak. In this regiment it was easy to trace the progress of the disease from company to company at three or four-day intervals until the entire regiment had been attacked.

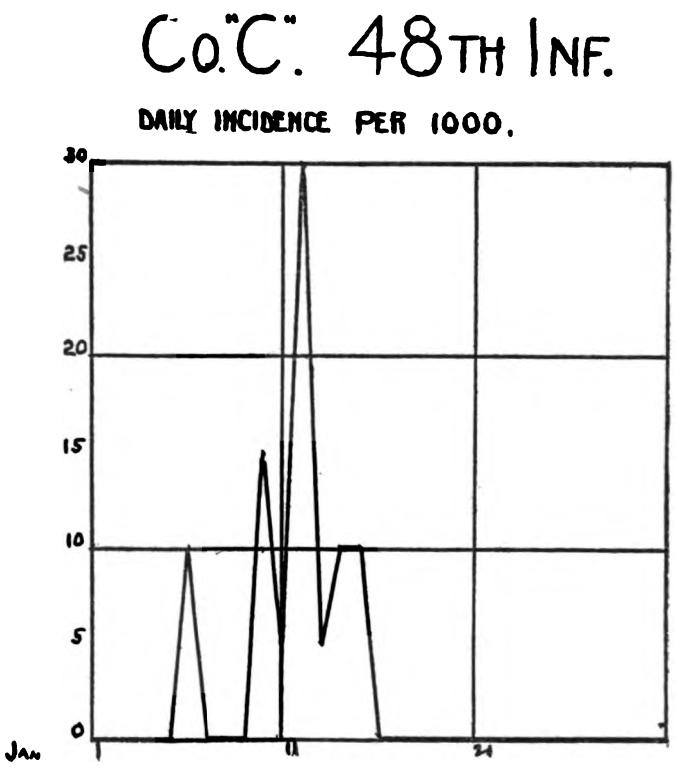

CHART 3.

An investigation of the methods of dish washing in vogue was promptly made, and it was found that one organization, Company C, owned a set of dishes and practiced collective washing while the others of the regiment were dipping with no particular care given to water temperature. Company C showed a case rate of 90 per 1,000 as compared with 56 per 1,000 for the entire regiment during this outbreak. Its curve of incidence shows fairly well the explosive character referred to (Chart 3).

These isolated and somewhat casual observations are not advanced as tending to prove the negative of the contention of Colonels Lynch and Cumming. The sterilization of eating utensils is a manifestly desirable measure and will undoubtedly tend to lessen disease wherever

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efficiently practiced. The object here sought is merely to call attention to the fact that other factors may cause great variation in the incidence rate of respiratory infections, that unless comparative statistics are strictly controlled by all the factors known to affect the susceptibility of the groups compared, misleading conclusions may be drawn, and that there is perhaps danger that undue emphasis on one method of prophylaxis may lead to neglect of others equally essential.

TABLE I.—*Comparison of Incidence of Influenza in the F. A. R. D. and in the 56th F. A. Brigade.*

	Strength	*Cases*	*Case rate per* 1,000
F. A. R. D.	24,600	5,273	214
56th F. A. Brigade	4,300	35	8.1

TABLE II.—*Comparison of Incidence of Influenza in the Newer Regiments and in the Older Regiments of the F. A. R. D.*

	Strength	*Cases*	*Case rate per* 1,000
Newer Regiments	6,681	2,548	396
Older Regiments	17,931	2,725	152

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THE OTHER SIDE OF THE QUESTION OF INDIRECT CONTACT INFECTION IN ACUTE RESPIRATORY DISEASES

By Lieutenant Colonel THOMAS W. JACKSON

Medical Reserve Corps, United States Army, Assistant to Commissioner of Health of Pennsylvania

DURING the year past there has been proposed with some insistence the doctrine that indirect contact infection plays the largest part in the spread of acute respiratory diseases and that direct droplet infection is nearly negligible; or to use the language of the chief exponent of the doctrine, in speaking of influenza, "The majority of influenza cases have arisen from interchange of sputum, through contaminated eating utensils." He also states that "The distribution of infection from the secondary case is limited to only minor routes which are of slight importance." [1]

Again he states the doctrine thus: "Above all is the necessity for popularizing our knowledge that it is the sputum-soiled hand and the contaminated eating utensil which plays the chief rôle in mouth-to-mouth infections." Again: "The vehicles for the transfer of germ-laden saliva from, and to, the mouth and nose, are the hands and eating utensils." [2]

That this propaganda has made its impression upon medical minds as well as upon the minds of laymen is evidenced by frequent editorial reference made during the year past in medical journals, with some signs of a disposition to accept the theory.

In justification it has been pointed out that editorial comment is supposed to take up new thought and is rarely conclusive; that it raises issues and expects to bring return fire.

The indirect contact doctrine has been reiterated, republished and disseminated through Sunday newspapers, luridly illustrated and purporting to have governmental sanction.

The imprimatur of medical journals has practically been used in these syndicated Sunday articles which endeavor to teach the public that doorknobs and the unsterilized knife, fork and plate are deadly, and that the sneeze, the cough and the projected mucus droplet are practically harmless and negligible.

While public health authorities everywhere, federal, state and municipal, are endeavoring to warn the people of the country of the dangers arising from droplet infection and therefore from crowded places, and are urging them to suppress and cover coughs and sneezes and otherwise to lessen droplet projection and the spread of respiratory infections

[1] Cumming, J. G.: *American Journal of Public Health*, November, 1919, p. 853.

[2] Lynch, C., and Cumming, J. G.: *American Journal of Public Health*, January, 1919, pp. 36 and 37.

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thereby, the revolutionary propaganda of the indirect contact advocates goes on, without seeming to awake realization of the possibility that it may defeat public health educational efforts along correct lines.

In my opinion it is improper and dangerous—with the evidence offered—to teach the public—or the profession, for that matter—that "conveyance of respiratory diseases by indirect contact infection possesses an importance far transcending droplet infection." The responsibility for the dissemination of such doctrine is not a light one.

In the presentment of both argument and statistics in December, 1918, before the American Public Health Association in Chicago, and later in medical journal articles here cited, the exponents of indirect contact infection have attempted to show that influenza incidence was profoundly affected and reduced in 66,000 troops in Newport News, Va. and vicinity in October, 1918, among the men whose tableware or mess-kits were washed in boiling water.

They failed to emphasize, however, in their several communications, the fact that the troops at Newport News were largely colored troops, whose low susceptibility to influenza was thoroughly demonstrated by observers in many camps. No attempt was made to measure or estimate the factors of susceptibility or relative immunity through race, rural or urban origin of troops, previous exposure or duration of exposure, either at Newport News or vicinity.

In one of the later contributions on the subject, "Influenza-Pneumonia as Influenced by Dishwashing in Three Hundred and Seventy Public Institutions,"[3] the reporter seems to have disregarded all other factors than that of steam dish-washing and to have omitted from consideration the fact that in institutions where steam dish-washing installations exist there are sure to be other modern installations and hygienic practices and arrangements.

An intensive experience with more than 100,000 soldiers in three camps—Meade, Custer and Bowie—during the respiratory disease epidemics in 1917 and 1918 gives me a profound conviction that contaminated dishes, eating utensils and bad dishwashing arrangements—disgusting and unpleasant as they admittedly are—had little to do with the spreading of influenza or other respiratory infections in 1917 or 1918.

At Camp Meade I carefully analyzed the influenza incidence statistics covering 42,000 soldiers and found that dish-washing methods had no effect whatever in influencing the number of cases at that camp. The only deterrent factor observed there was that of race, the colored troops having a much lower per cent incidence. These facts were duly reported in the monthly epidemiologic reports to Washington.

[3] *American Journal of Public Health*, November, 1919, pp. 849-853.

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From the Great Lakes Training Camp (50,000 young men) Surgeon Mink, U. S. N., reported at the Chicago meeting in December, 1918, that the influenza incidence in organizations using dishes and eating utensils washed in bulk, and practically sterilized, did not differ from the incidence in troops using the older and far less sanitary method of dish-washing, by dipping into common containers of wash water.

In other camps and in government laboratories statistical studies and experiments were inaugurated to determine the probable truth or fallacy of the "indirect contact" doctrine, and the publication of the results of these inquiries will be interesting to the adherents of both sides of the question. The findings will be published in due time, no doubt, and meanwhile newspaper propaganda should cease, awaiting professional judgment.

To preach the harmlessness of crowds and of droplet projection or to deny that aerial pathways of infection are of the highest importance cannot fail to arouse protest from public health authorities whose duty it is to instruct the public.

The real danger arises not from the judgment of thoughtful men who weigh evidence and refuse to accept dictum for proof, but from the unthinking who accept the seal of a copyrighted syndicate newspaper article as the hallmark of truth; nor do I desire by this remark to belittle the value of public health teaching through the public press. Let us see to it, however, that such teaching is harmless.

Carried to its logical conclusion the newly advanced doctrine is that the infectious respiratory diseases are chiefly acquired by ingestion.

It is a significant fact, it seems to me, that in the public services, everywhere, none of the injunctions based upon the older conception of droplet projection and direct transference of respiratory infections have been abrogated or modified.

In their paper read at Chicago before the American Public Health Association in December, 1918, and published in the January, 1919, issue of the journal of that Association the effective range of droplet projection was given by Lynch and Cumming as 18 inches.

They qualify their statement by specifying "mouth pathogens in droplets expelled by coughing" and contend that these bacteria probably will not infect plates placed on the level with the mouth beyond the maximum distance of 18 inches. They assert that the probability of infection by the flight of organisms is remote.

In contravention of this view attention is invited to the reports of experiments by Doust and Lyon[4] wherein they show by bacteriologic experiments that droplets are projected in ordinary speech, loud speech and coughing from 1 foot to 6 feet.

[4] *Journal of the American Medical Association*, October 12, 1918, p. 1216.

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There are many other authentic experiments of record and every one will recall instances wherein he has personally experienced perceptible spraying of the face, by cough, sneeze, explosive laugh or speech, through much greater distances than 18 inches.

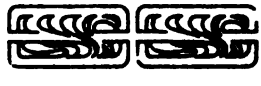
Indeed, a veritable barrage of minute droplets may be assumed wherever a fair-sized group or crowd is congregated, even out of doors, particularly if its members engage in singing, cheering or even ordinary conversation. Under such circumstances thousands of possibilities of infection might occur within a few moments.

It should be borne in mind that the term "spray infection," as generally used, means visible and perceptible droplets, whereas droplets may easily be so minute and discrete as to be invisible and to escape recognition by sight or sensation. A sneeze in front of a mirror at a distance of several feet will demonstrate the varying size and the great number of projected droplets.

Transference of living bacteria in droplets directly from the mucous membrane of one person to the mucous membrane of eyes, nose or mouth of another, as accomplished by spray or droplet infection, is a very different proposition from the indirect mechanical transference, by hand or otherwise, of bacteria which may have ceased to be viable through exposure to conditions outside of the human body.

Under ordinary daily conditions of life there must be extensive overlapping of individual spray projection zones and even more intricate intersections of such zones will exist, of course, in crowded street cars and similar places. In fact it is difficult to imagine spending a working day or a shopping or recreation day in any city, or in crowded restaurants, theaters, trains and streets without being within the effective droplet range of other persons much of the time.

Any comprehensive discussion of the infection methods of respiratory diseases must, of course, include consideration of the well-recognized factors of dust irritation and dust-borne bacteria, which constitute an indirect method, by inhalation, of an entirely different kind—one not to be dismissed lightly. This method simply calls for mention, however, at this time, as an additional reason why the indirect contact infection of the kind urged by Cumming and others cannot play the all-important rôle claimed for it in the journal articles cited below.



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EDITORIAL

OUR DUTY TO THE RESERVE

Since we have occupied the Editorial Chair of this magazine we have gone on record more than once in respect to this question and have tried to make it manifest that in our opinion there ought to be entire accord between the professional soldier and those who take up the question of service under arms, in addition to the other duties of citizenship, and from a proper feeling of patriotism and a desire to fulfil in its entirety the obligation which rests on every loyal man.

We wrote one or two editorials along these lines in the endeavor to prove that there is, fundamentally, little difference between the man who elects a military career as his life work and the one who desires to learn enough of it to be of service to the state in the event of a call to arms.

It is dodging the issue to refuse to recognize the fact that there has existed between these two classes, the professional soldier and the so-called "citizen soldier," more or less misunderstanding in times past. That is acknowledged, we believe, by both. Furthermore, there is no doubt that there have been grounds, on both sides, for this feeling of hostility. It must be admitted, however, by the partisans of either faction that this was something which was limited to individual and unfortunate instances, and that there could not be any rational basis for a misunderstanding which embraced either side as a whole. It is manifestly absurd to condemn any class for the shortcomings of certain individuals of the class. It is indisputable that the late war did much to break down these artificial class lines, which existed more as a matter of tradition than from any real basis on fact. When men have gone through battle shoulder to shoulder, have shared danger and hardship in a common cause, it must necessarily do away, to a very large extent, with any inherited dislikes which have had no real foundation except that they had long been supposed to exist. The war was the means of accomplishing an important thing in putting both classes on a better mutual footing; it taught each to know the other and it became quite evident that the "regular" was no more a disagreeable martinet than was the militiaman a jealous citizen who resented any attempt to help him in the knowledge of the art of war. It taught us to *know each other*, and, after all, that was about all which is necessary to lay the foundation of mutual friendship and liking.

We stated in one editorial that it would be difficult, if you took the clothes off a major general, a private, a regular and a militiaman, to tell one from the other. That what counted was that which was *in* the man, not *on* him, and that it would be good logic to rest our likes and dislikes on that ground rather than to make them dependent on what we wore.

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We still think that is so and that if we begin, and end, with the hypothesis that we are all men and common citizens of our Republic, we shall find much in each other to like and lose sight of many of the petty jealousies which have rather confused our vision and warped our judgments in the past.

It is quite proper and desirable that we of the Regular Service should be the instructors, the big brothers, of our friends who do not make soldiering their entire business; and it is also well for us of the Regular Services to realize that, among those we teach, there are many keen and able minds and that oftentimes in our rôle of instructors we may have the benefit of ideas which may help us in the execution of our own duty. The editor saw service as "Inspector-Instructor" with the militia of two states, and his relations with those he inspected and instructed were so pleasant as to make the period of that duty enjoyable and profitable. This is, without doubt, the experience of most of those who have served in a similar capacity and is only a further proof of what we have said, that when we know each other we shall each find that the other is a good fellow and very worth while.

The object of our Association is to promulgate that feeling for the benefit of the state, since as good citizens that is the ultimate end for which we all work. That it has been attained in our society is beyond a doubt; our membership of regulars and reserves is testimony of it.

We of the Association have known this, of course.

To have it recognized by others and to be complimented on it cannot fail to be a source of pride and satisfaction to all of us who make up the membership of The Association of Military Surgeons. And so it is with a sense of much satisfaction that we publish the following letter from the Chief of Staff of the army which came to this office, unexpected and unsolicited, a few days ago.

We think that we voice the opinion of The Association in saying to the Chief of Staff that we shall still try, as we have in the past, to make our body one which may be thought well of by the Government, and one which may be seriously considered as an asset in preparation for the defense of the state in the time of her need.

JAMES ROBB CHURCH.

WAR DEPARTMENT
OFFICE OF THE CHIEF OF STAFF
WASHINGTON

MARCH 5, 1920.

From: The Chief of Staff.
To: Association of Military Surgeons.
(Through the Surgeon General of the Army.)
Subject: Officers' Reserve Corps.

1. During the process of demobilization, the strength of the newly built Officers' Reserve Corps has reached approximately 75,000 officers of all grades and arms.

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These officers are a valuable asset to the military establishment and the stimulation of their interest in military matters, including such instruction as it is practicable to give them, is desired by the War Department.

2. Pending the enactment and carrying into effect of legislation for the reorganization of the Army, it is impracticable for the War Department to announce details relative to the organization and instruction of the Reserve Corps and the obligations, privileges and promotion of its members. In the meantime, it is suggested that reserve officers be given such information and instruction as is possible through the various service publications.

3. There are now in existence, or in the process of formation, associations of officers of various arms of the service. It is understood that reserve officers are eligible and welcome to membership in these Associations. The latter offer an existing and effective means of furthering close affiliation of regular and reserve officers and of furnishing instructive and informative matter to the Reserve.

4. Established service associations can probably provide for occasional semi-social local gatherings of regular and reserve officers, which gatherings will serve to bring about acquaintance and better understanding among all officers.

5. The Department has noted your efforts to encourage reserve officers to become members of the Association of Military Surgeons and trusts that such efforts will be continued and all reasonable steps taken by you to further the morale and instruction of reserve officers. The value of THE MILITARY SURGEON as a medium for the transmission of informative and instructive matter to reserve officers is fully appreciated. These efforts are approved by the War Department.

(Signed) P. C. MARCH,
General, Chief of Staff.

COLONEL LOUIS A. LA GARDE, U. S. ARMY

In one of the most charming of all the charming "Spectator" papers, Steele has drawn a word picture of the big-hearted man who *enjoys* doing those things which make his fellows love him. The theme is handled by the master essayist as an antithetic picture, by the limning of another type, who seeks personal plaudit and advantage, in the show of the spirit of kindliness.

Those who knew him best could easily read the picture of the altruist as expressing, in goodly measure, the character and impulsions of Col. Louis A. LaGarde, U. S. Army, who died recently. Certainly he carried the kindly heart and he gave forth very abundantly to those about him, and at all times, evidences marking the sweet spirit which goes with such a heart.

To be hospitable and generous, helpful and cordial was perfectly natural to him, and he assumed nothing and studied nothing in showing those qualities. At the same time, he carried with him a faculty of fully and correctly estimating worth, and its opposite, and no one who knew him could say that he let generosity overcome a certain sound judgment of men.

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It was a rare treat to put your feet under a table with his feet. The good fellowship beamed from his kindly face and merry eye, and the scrutiny which he gave the solids and liquids put out for refreshment gave sauce to appetite second only to hunger.

The "Ballad of the Bouillabaise" was well known to him, but equally he knew how to concoct the mixture which inspired that gem of gastronomic lays. The menu at a good hotel gave him a theme for spirited comment and proper suggestion, which made one know that his refection was in the hands of a lover of his kind, and neither stint nor incongruity would find any place in the product of the little study, made for his benefit. Abstemious himself, he loved to provide for the friend at his side, and dull care never rode behind one who had the sunny presence of "Mr. President" to banish the unpleasant things in life and grace the passing hour.

This delightful realization of a jovial, kindly gentleman was coupled with a cultivated scientific habit of mind which made Colonel LaGarde a place in the foreground of the men whose professional work has added credit to the Army Medical Corps. For many years he held a clear-cut preëminence as an investigator and authority in gunshot surgery and the medico-military knowledge of fire-arms. He produced a great deal that is of lasting value, and his painstaking experimental work opened up new and abiding factors in the knowledge of gunshot infections. He gave the medical and military worlds much knowledge which was new to both, and in that achievement he earned and merited a broad fame, which will permanently adhere to his name and memory.

When Colonel LaGarde stood in the presence of the Master, he stood there like Colonel Newcome, a man—a gentleman—one who had done good work in this life, and whose heart was, yet, "as that of a little child."

F. A. Winter.

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COMMENT AND CRITICISM

A METHOD OF PROPHYLAXIS IN RESPIRATORY INFECTIONS

In the February 21 number of the *Journal of the American Medical Association*, Corper and Enright, of Denver, write upon, "The Eye as a Portal of Entry of Infection in Respiratory Diseases," citing an interesting and suggestive series of experiments in which *B. prodigiosus* was used as an indicator or control. Their studies were directed primarily toward the working out of the avenues of tuberculous infection, but it is the belief of the writer that upon the general proposition of the respiratory diseases their ground is well taken and that the eye, in this connection, is worthy of the most careful consideration, alike in military and in civil practice. So convinced is he of this that both when commanding officer of Hospital Train No. 58 (A. E. F.), and later when surgeon of the 60th Artillery, C. A. C., this was the basis of a system of attempted prophylaxis, when respiratory disease appeared to be threatening in epidemic proportions.

In upper respiratory tract infections the lacrymal system appeared to be the quickest and the safest method of medication of the infected tract where large numbers had to be dealt with; and patients, both confined to bed and ambulant, received at two or three-hour intervals instillations of one drop of 20 per cent argyrol or its equivalent into each lower conjunctival sac. Contacts were similarly treated at three-hour intervals, and when in cantonments at Pontenezen, with a rising influenza and bronchitis curve in the surrounding community, what is believed to be a fairly low record, was secured for this regiment by the use of this method at the battalion and the regimental infirmaries.

This procedure was employed in hospital, in cantonments, in billets, on transports, and even in the field during offensive operations, and it is believed that it is worth much more than the trifling expenditure of time, effort and material involved in its application. It is equally applicable to individual cases and to groups of cases in civil practice.

While it is far from being the belief of the writer that this procedure yields 100 per cent results, it is his conviction that material results can be obtained in the diminution of infectious and communicable respiratory disease thereby.

EDWARD M. COLIE, JR.,
Lieutenant Colonel, M. R. C.

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STATISTICAL RÉSUMÉ OF THE FRENCH MEDICAL SERVICE

In the "Revue Interalliée pour l'etude des questions interessant, Les Mutilés de la guerre," for September, 1919, an article appeared entitled "L'oeuvre du Service de Santé Française pendant la guerre." Name of the author not given. This is a statistical study based mostly on "Chiffres" or memo reports and accompanied by graphic charts showing the magnitude of the problems which the French Medical Department had to solve during the war. While these statistics are necessarily incomplete, it is interesting to note some of the figures.

France mobilized 8,410,000 men during the war. The total cost of the Medical Service was 2,416,647,598 francs or 61 fr. 20 per man per year. The evacuation of sick and wounded by the "Service de Santé" between August, 1914, and April, 1919, numbered 9,287,822. This apparently does not include those treated for slight illnesses or wounds and who returned promptly to their commands. Also it is seen that these evacuations exceeded the number of men mobilized by 877,822, and this without deducting number of killed in battle. The actual number of wounded who returned to the front after hospitalization must have been large.

The year 1915 shows the highest number of evacuations, 2,528,579 being disposed of. Included in these figures is the maximum number of wounded for any year during the war; 1,334,966 "blessés" having been evacuated. This may readily be accounted for when one remembers the aggressive drives of the Germans and the determined resistance of the French. The maximum sick were evacuated during 1918 when 1,318,026 were handled. This high figure for sick was due to the prevalence of influenza.

There were 390,362,542 days lost in hospital between August, 1914, and December, 1918. The minimum stay in each hospital was thirty-two days in 1914 and a maximum of fifty-seven days during 1916. The cost of hospitalization per day, per man was 3 fr. in the military hospitals and 6 fr. in the auxiliary hospitals. The military hospitals would seem to have been the more economical.

Tuberculosis and influenza were the two main diseases of the war and caused a great many deaths. There were 111,038 discharged from the Army between August, 1914, and December, 1918, on account of tuberculosis, and of these 25,600 were pensioned and 85,438 were discharged without pension. There were 12,220 deaths from this disease in the Army. Influenza took its toll during 1918–19. Between December 1 and April 30 there were 27,316 deaths. In December alone there were 23,202 deaths, 11,391 of these occurring in the Zone of the Army and 11,211 in the Zone of the Interior. This shows a higher rate for the Zone of the Army.

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Development of Roentgenology in France received a great impetus during the war, and figures given for 1918 between January 1 and November 3 show how much they came to use this valuable adjunct. There were 958,166 X-ray examinations of 295,389 subjects. Of these 485,721 were radioscopic, 216,738 were radiographic, 162,576 localizations, and 93,121 were for the extraction of foreign bodies; 11,033 treatments were given.

During the war centers were established to which soldiers were sent for classification and disposition after the maximum amount of useful hospitalization had been reached. These boards decided whether a man was fit for further service or should be discharged, either permanently or temporarily. All medico-legal questions were also decided by these boards. Mainly they studied and recorded the amount of disability with a view to pension; 1,034,232 soldiers of all grades passed through these centers.

There were 92,325 severely wounded soldiers having amputations and other functional mutilations who were supplied and fitted with appliances.

No figures were given of the total number of casualties, nor the proportion of deaths from disease compared with deaths as battle casualties, nor what percentage of wounded were returned to the front after hospitalization. These figures, as well as the incidence of other diseases, especially those due to soil pollution, would ve very interesting and will no doubt be forthcoming in later reports.

JOSEPH F. GALLAGHER,
1st Lieut., M. C., U. S. V.

LAKE KEUKA MEDICAL AND SURGICAL ASSOCIATION

The Lake Keuka Medical and Surgical Association will hold its annual meeting, July 29 and 30, 1920, at Keuka College, Keuka Park, N. Y.

The scientific program, which is being arranged, will include short addresses on practical subjects which are of special interest to the physicians who live in the various counties represented.

This Association is peculiar in that it has no membership in the sense that most organizations have, but the meeting is open to all licensed practitioners of medicine. The controlling body consists of an executive committee appointed at the time of each annual meeting from among those in attendance from the various counties. There are no dues except a small fee for incidental expenses which is paid by those who attend.

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ARMY CASUALTY LIST

The following figures represent the revision of the former published list which gave a total of 293,061 and 77,635 deaths.

The ratio of death from disease and death from battle causes is significant.

Killed in action	34,248	Prisoners unaccounted for	15
Died of wounds	13,700	Prisoners died	147
Died of disease	23,430	Prisoners repatriated	4,270
Died of accident	2,019	Total prisoners	3,432
Drowned	300	Wounded slightly	91,189
Suicide	272	Wounded severely	83,390
Murder or homicide	154	Wounded, degree undetermined	46,480
Executed by sentence of general court-martial	10	Total wounded	221,059
Other known causes	489	Missing in action	3
Causes undetermined	1,839		
Presumed dead	650	Grand total	302,012
Total dead	77,118		

J. R. C.

THE NATIONAL ANESTHESIA RESEARCH SOCIETY

At a meeting of the Board of Governors of the National Anesthesia Research Society held in Cleveland in March, it was voted to have the annual convention of the Society at Pittsburgh the week of October 4, this meeting to be in conjunction with that of the Inter-state Anesthetists' Association and the Pennsylvania Medical Society. It is possible that the Western Pennsylvania Dental Association also will join in the meeting.

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BOOK REVIEWS

INJURIES TO THE HEAD AND NECK, by H. Lawson Whale, M.D., Camb.; F.R.C.S., Eng.; Captain R.A.M.C. (T.F.); formerly Captain, I.M.S. (Retired); The Queen's Hospital, Sidcup; No. 83 General Hospital; and Surgical Specialist to No. 53 General Hospital, B.E.F.; Surgeon for the Eye, Ear, Nose and Throat to the London Temperance Hospital and to the Hampstead General Hospital. Preface by Col. Frederick F. Burghard, C.B., M.D., M.S., F.R.C.S. New York: Paul B. Hoeber. Price, $5.00.

Dr. Whale's wide experience along these lines—beginning with the first battle of Ypres, where he handled many of those cataclysmic injuries to the face and neck which were the despair of the surgeons in those early days; later in the department of oral surgery at Boulogne where excellent results were early obtained; and finally at Queen's Hospital, Sidcup—make his study of the subject thorough and authoritative.

A widening horizon has been opened to specialists of the ear, nose and throat. The explorations of the rhinologist now extend to the pituitary fossa; those of the laryngologist, by endoscopy, to the bronchi and esophagus; while the aurist, being constantly confronted with ototic intracranial infections, is practiced in dealing with the middle and posterior fossae of the skull.

Since interest in facial surgery is certain to outlive the war which aroused it, the chapters dealing with this subject will be found especially valuable. In the sections on facial and nasal surgery, an attempt has been made to assist medical men in industrial districts and other communities where machinery accidents occur by suggesting to them not only what to do at once, but also what to leave until later. The handling of gunshot injuries of the face and jaw, as outlined in this volume, forms a stirring and profound chapter on the new technique of present-day surgery as developed by the necessities of the war.

FRANCIS M. MUNSON.

EDUCATION IN PEACE AND WAR, by Stewart Patron, M.D., Lecturer in Neurobiology, Princeton University; Lecturer in Psychiatry, Columbia University; President, Eugenics Research Association. New York: Paul B. Hoeber, 1920. Price, $1.50.

During the war the public developed keen interest in cases of so-called "shell-shock," and the methods developed for its prevention. The author shows that peace, no less than war, produces "shell-shock." Those who are nervously unfit fill the almshouses, reformatories, courts, hospitals and sanitariums, and the author shows the necessity of training investigators competent to undertake the solution of these problems.

FRANCIS M. MUNSON.

SOCIAL WORK—Essays on the Meeting-Ground of Doctor and Social Worker, by Richard C. Cabot, M.D., Boston and New York: Houghton Mifflin Co.; Cambridge: The Riverside Press, 1919. Price, $1.50.

Doctor Cabot has placed at our disposal an illuminating set of essays on social medicine which will prove useful to physician and social worker alike. The author used some of the same material in his lectures given at the Sorbonne early in 1918 which were later published by Cres & Cie under the title of "Essais de Medicine Sociale."

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In the introduction the historical development of social assistance in medical work is traced in an interesting manner. Part I is entitled "Medical-Social Diagnosis" and treats of such subjects as the medical standing, duties, and equipment of the social assistant; economic investigation by the social assistant; mental investigation by the social assistant; the social worker's investigation of fatigue, rest, and industrial disease. In Part II, under the heading, "Social Treatment," samples of social treatment are given and the motive of social work is explained.

FRANCIS M. MUNSON.

MANUAL OF TROPICAL MEDICINE, by Aldo Castellani, C.M.G., M.D., M.R.C.P., Lecturer at London School of Tropical Medicine; Emeritus Professor, Ceylon Medical School; Lieut. Colonel, Royal Italian Naval Medical Service, 1916–1918, Balkan Zone; etc., etc., and Albert J. Chalmers, M.D., F.R.C.S., D.P.H., Director, Wellcome Tropical Research Laboratories (Soudan Government); Ceylon Medical Service, 1901–1911, etc., etc. Third Edition. London, 8 Henrietta Street, Covent Garden: Bailliere, Tindall and Cox, 1919.

This valuable work needs no introduction to those of the medical profession interested in tropical medicine and hygiene. The preparation of this, the third edition, was delayed by the war but advantage has been taken of the opportunity to rewrite large portions of the book, to introduce many new subjects, and to greatly increase the number of illustrations. It now contains over twenty-two hundred pages of text, but its retention in the form of one volume is considered advisable by the authors as their experience in the tropics has led them to believe that this is the most convenient form for the tropical practitioner and student.

FRANCIS M. MUNSON.

SHELL-SHOCK AND NEUROPSYCHIATRY, by E. E. Southard, with a bibliography by Norman Fenton. Monography Number Three of the Psychopathic Department of the Boston State Hospital. Boston: W. M. Leonard. Publisher.

This is a compilation of 589 cases of war psychoses, neuroses, and commotions, some of which proved to be epileptics, alcoholics, asthenics, hebephrenics, cyclothymics, sub-normals, and troponematoses, all of which are persistently termed by laymen "shell-shock." A critique of the data follows in which the attitude of the state towards the syphilitic further damaged by war is discussed in favor of the man, a conclusion which does not harmonize with that of French psychiatrists. Epilepsy is then similarly discussed. Cases to illustrate the somatic factor in shock receive detailed presentation also. Following is a discussion of the functional neuroses; and here the opinion is expressed that the positive conception of Babinski is confirmed by the data of the war. The lack of relation of war neuroses to insanity is brought forth. The dynamopathic concept of these disorders is emphasized, and diagnostic tables from Babinski are included. There is then a discussion of the pathology of commotion, and finally the treatment of the neuroses is reviewed.

Greater definiteness in epicrisis would have been reached, the reviewer believes, had the editor studied cases in France and had he discussed the later work of the French and English neurologists with them. The book, which is prefaced by an introduction by Charles K. Mills, concludes with a very extensive bibliography, although, of course, many more valuable articles have been published subsequent to the issue.

TOM A. WILLIAMS.

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MANUAL ON FOOT CARE AND SHOE FITTING: For Officers of the United States Navy and United States Marine Corps, by W. L. Mann, Ph.B., A.M., M.D., Lieutenant Commander (M. C.), U. S. Navy, Post Surgeon, Marine Barracks, Quantico, Va.; and S. A. Folsom, M.D., Lieutenant (M. C.), U. S. Navy; Medical Officer in Charge of Orthopedic Division, Medical Department, Marine Barracks, Quantico, Va. With 58 Illustrations. Philadelphia: P. Blakiston's Son & Co. Price, $1.75 net.

A knowledge of the contents of this little manual will relieve the mind and increase the efficiency of the command of many a hard-worked officer, line and staff. It gives him precisely what is necessary for the proper care of the feet of his men and will serve as a guide and source of reference for all officers whose duties involve the supervision of enlisted men and responsibility for their welfare. The book is well written in language not too technical, and bids fair to create an interest in this important subject.

The subject-matter is divided for discussion into a number of sections under such headings as "Responsibility for Proper Fitting of Shoes," "The March," "Developing the Feet of the Recruit," "Care of the Shoes," "Military Foot Inspecttion," and a number of sections devoted to the consideration of orthopedic affections of the feet.

The illustrations are excellent and are nearly all original.

FRANCIS M. MUNSON.

POPE'S MANUAL OF NURSING PROCEDURE, by Amy E. Pope, formerly Instructor in the School of Nursing, Presbyterian Hospital, New York; Author of "A Medical Dictionary for Nurses," "A Quiz Book of Nursing," "A Dietary Computer," etc. New York and London: The Knickerbocker Press, 1919. Price, $2.40.

Miss Pope's latest text-book on nursing has been prepared more especially to facilitate teaching, by demonstration, as much of the practical work of nursing as is usually included in the junior year instruction. In addition to the descriptions of demonstrations, directions are given for treatments which cannot generally be shown in class and precautions are mentioned which, though essential in the care of patients, cannot be carried out in class. In compiling the work great care has been given to details and the reason for each separate procedure is made clear to the young nurse; practice is correlated with theory. The course, of which this is intended to be the text-book, is assumed to be given in the form of ninety carefully graded demonstrations, beginning with the care of the ward and its furnishings and ending with Carrel-Daking treatment of wounds. A desirable feature is a carefully prepared list of the equipment needed for each nursing procedure. The type is clear, the binding and paper substantial and the illustrations sufficient.

FRANCIS M. MUNSON.

RAMBLING RECOLLECTIONS—An Autobiography, by A. D. Rockwell, M.D. New York: Paul B. Hoeber, 1920. Price $4.

Dr. Rockwell tells the story of his life in a very human way, and his book can hardly fail to interest all readers, whether friends of the author or not. During his career as a surgeon in the Federal Army during the Civil War, and later as a neurologist in New York, he saw many interesting historical events and met and associated with many of the most prominent men of his time. The description of the first electro-executions, with which Dr. Rockwell was associated in an advisory capacity, and the reminiscences of such characters as Edwin M. Stanton, President Hayes,

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Henry Ward Beecher, Commodore Vanderbilt and Mark Twain are well worth reading.

Printed in easily read type on good paper, and handsomely bound in extra cloth, this book will make a pleasing addition to the doctor's "bedside library."

FRANCIS M. MUNSON.

HELPING THE HELPLESS—in Lower New York, by Lucy Seaman Bainbridge, Honorary Superintendent, Woman's Branch, New York City Mission Society; author of "Round the World Letters." Introduction by Rev. A. F. Schauffler, D.D. New York and London: Fleming H. Revell Co.

The long experience of Mrs. Bainbridge in welfare work has given her a very clear understanding of both the practical and spiritual phases of applied sociology. In this interesting book she relates a series of selected incidents showing the nature of her work and the splendid results attained. A study of the methods found so successful in solving the many complicated problems arising among our newly arrived foreign population will be of material assistance to those whose duties take them to such fields of endeavor as lower New York. The stories are told in a pleasing manner and the typography and binding of the book are excellent.

FRANCIS M. MUNSON.

PHYSICAL RECONSTRUCTION AND ORTHOPEDICS, by Harry Eaton Stewart, M.D., Lieutenant, Medical Corps, United States Army, Division of Orthopedics; Assistant Instructor, Section of Physiotherapy, Surgeon General's Office; Instructor in Medical and Orthopedic Gymnastics and Massage, New Haven Normal School of Gymnastics; Attending Surgeon, New Haven Orthopedic Dispensary; formerly Instructor in Corrective Gymnastics, Teachers College, Columbia University. Authorized for publication by the Surgeon General, United States Army, New York: Paul B. Hoeber. Sixty-four original illustrations. Cloth, 8vo. Price, $3.75.

In this timely manual the author has presented in condensed form the main principles of orthopedics in the treatment of the defects of childhood, war injuries, and industrial accidents, laying stress upon the treatment by massage, exercise, and other types of physiotherapy. He gives the directions for the various types of treatment as well as the theoretical considerations. This will be of great assistance to reconstruction aides in physiotherapy, workers in vocational reconstruction, physical directors, and orthopedic surgeons. The illustrations are excellent and the typographical work leaves nothing to be desired.

FRANCIS M. MUNSON.

BOOKS RECEIVED

Books received are acknowledged in this department and such acknowledgment must be regarded as a sufficient return for the courtesy of the sender. Selections will be made for review in the interest of our readers and as space permits.

POPE'S MANUAL OF NURSING PROCEDURE, by Amy Elizabeth Pope. New York: G. P. Putman's Sons. Price, $2.40.

FOOT CARE AND SHOE FITTING, by W. L. Mann, Lieutenant Commander, U. S. Navy, and S. A. Folsom, Lieutenant, M.C., U.S.N. Philadelphia: P. Blakiston's Son & Co. Price, $1.75 net.

SURGICAL SHOCK AND THE SHOCKLESS OPERATION THROUGH ANOCI-ASSOCIATION, by George W. Crile and William E. Lower. Philadelphia and London: W. B. Saunders Company, 1920. Cloth, $5.00 net.

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THE
MILITARY SURGEON
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PREPAREDNESS OF THE MEDICAL DEPARTMENT OF THE NAVY FOR WAR AND MEDICAL DEPARTMENT ACTIVITIES DURING THE WORLD WAR

BY REAR ADMIRAL WILLIAM C. BRAISTED
Medical Corps, United States Navy, Surgeon General of the Navy

THE work of the Medical Department of the Navy in the World War has so often been the subject of favorable comment by experts and by others who were brought intimately into a position to observe its activities that it would seem permissible at this time not to undertake to demonstrate that the Department was prepared for war, but rather to review briefly the story of the constant thought which was and must be given in time of peace, in the every day affairs of this branch of the naval service to the possibility of great and sudden emergency. Such a review will serve a useful purpose if it leads to a more general realization of the vast amount of work, much of it requiring years of patient labor and continual training of personnel that is necessary if the organization of the Medical Department is to withstand without strain and disastrous delay the initial violent efforts to mobilize the Navy for immediate action. The dangers of disease and the likelihood of great loss of life are unavoidable concomitants of a sudden outbreak of war.

Early in 1918 a careful investigation of the conduct of the Navy in war was made by a sub-committee of the House Committee on Naval Affairs. The report of that committee reads in part as follows:

> The first battle of the war, that against disease, was fought and won by the Medical Department of the Navy. After diplomatic relations with Germany were broken in February, 1917, recruits, we find, streamed into the service in increasing numbers, and in April there was grave danger that the overwhelming influx of volunteers would overtax all training stations and receiving ship facilities and bring disaster to the Navy at the very beginning of the war by the introduction and spread of epidemic diseases which unfortunately were widely prevalent throughout the country at that time. In spite of all the difficulties in the way of rapid expansion and the sudden necessity for the training of new medical personnel and hospital corpsmen, the health of the Navy has been even better than in peace times.
>
> The Medical Department facilities have undergone tremendous development everywhere. The excellent and finely equipped base hospitals which were built before the war, have been greatly expanded with a speed which could not have been

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attained if the organization of the Medical Department as a whole had not been carefully thought out long before war came and plans perfected for the immediate enlargement of base hospitals and the construction of emergency hospitals of the finest type wherever necessary. The total bed capacity of naval hospitals was thus increased in a period of a few months from 3800 to more than 15,000 beds. The mothers of the country can rest assured that in these hospitals their sons will receive excellent care and nursing and the most skilled treatment that modern medical and surgical knowledge permits. The Navy Nurse Corps, comprising women of the highest type in the nursing profession has been increased to more than 700.

On board ship and at naval stations the health of the men is protected by all the safeguards known to preventive medicine. The Hospital Corps, upon which falls exclusively the nursing of the sick and wounded outside of hospitals, has been increased from 1,500 to nearly 9,000. Hospital Corps training schools have been established in connection with the training stations at San Francisco, Great Lakes, Newport (R. I.) and Hampton Roads. In these schools young men of good character and aptitude are intensively trained for their duties at sea.

Foreseeing that the hospital ship now under construction would not be completed in time to meet the war needs of the service, two large liners were secured and converted into hospital ships to supplement the work of the hospital ship *Solace*.

Admiral Braisted arranged that the transports operated by the Navy should have ample Medical Department facilities and necessary equipment, and so far as naval facilities exist, has assumed responsibility for the medical and surgical care of all Army sick and wounded who may be transported home on naval vessels from Europe.

For the care of our naval forces in England, France and European waters three base hospitals are already in operation abroad.

In expanding the Medical Department to meet the present and future needs of the Navy, we were glad to find that the needs of the increasing numbers of industrial workers and other civil employes in the large manufacturing plants and navy yards had not been overlooked. The peace-time humanitarian work is also being continued in connection with Haiti, Santo Domingo, Virgin Islands, Samoa and Guam, involving a population of over 2,000,000 people.

The report concludes with the statement, "It may well be said that the reason for this successful record is to be found in the bureau's preparedness, due to foresight and coöperation."

In the early months of the war when the medical members of the Council of National Defense were studying our organization and work they repeatedly expressed admiration of the smoothness of operation and the celerity with which large undertakings were accomplished. In fact they and others competent to judge were of opinion that there was no finer medico-military organization in the world at the outbreak of war than that of the United States Navy.

For a true perspective of medical department preparedness it is necessary to go back several years. It is our business at all times to prepare for war. Long before events suggested the probability of war among European nations, preparations for war—any war—were going on steadily. Owing to Surgeon General Rixey's foresight I was sent to

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Japan during the Russo-Japanese War as medical observer to gather information that might be utilized in our own preparations. Much was learned during my year of study in Japan and the knowledge gained proved to be of the greatest value. In the years previous to the world war the vivid preconceptions of war and all that war means, formed as a result of that experience, were of the greatest help to me in looking forward to the possibility of war.

Upon returning from Japan I assisted Surgeon General Rixey in his vigorous policy of enlarging, extending and modernizing our chain of base hospitals. He accomplished a great deal not only in this direction but in the improvement of conditions relating to personnel as well, and from his time forward the Medical Department has been engaged in unremitting efforts to prepare for any eventuality in so far as the public interests and the judgment of the people permitted.

The subject of medical department preparedness for war may be considered under the following headings:

1. Organization.
2. Personnel.
3. Hospitals, hospital ships and other provisions for the care of the sick and wounded.
4. Material equipment: Medical and surgical supplies; medical and surgical equipment.
5. Preventive medicine and sanitation.
6. Finances.

The Medical Department must be organized in time of peace in such a way that rapid expansion can take place without any change in the scheme of organization, without confusion, and without retarding or interfering with routine work, because with mobilization for war there comes a tremendous and sudden increase in the work of the medical department, both in connection with the induction of officer and enlisted material of all ratings into service and on account of an increase in sickness inevitable with an untrained and unseasoned personnel undergoing intensive training. At the same time the new medical department personnel must be trained rapidly. Provision must be made for the care of greatly augmented naval forces in the way of enlargement of base hospital facilities, and plans must be laid in advance to meet all possible contingencies which may arise from the special character of the war.

For several years before this war the most careful consideration was given to matters of organization. Shortages of medical department personnel in relation to the growing peace-time Navy were pointed out and appropriate legislation was recommended. The difficulty of

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effecting rapid expansion of the medical corps and of the hospital corps, under the existing conditions of many years standing, was clearly recognized.

The hospital corps of the Navy is peculiar to the United States Navy. It was established as such in 1898 and reorganized in 1906. The Nurse Corps, composed of trained women, was established in 1908 as a further step toward preparedness and assurance of the best possible care of the sick and wounded in accordance with modern standards of nursing. The Medical Reserve Corps was created by Act of Congress, August 22, 1912, with a view to paving the way for the rapid mobilization of additional medical officers for active service in case of war.

Before the war complete reorganization of medical department personnel was effected. The distribution of medical officers on a fixed basis took place with proper distribution in grade and rank so that when war came it was only necessary to take in the additional personnel as rapidly as required to keep pace with the growing strength of the Navy. Similar changes in the hospital corps were also brought about.

In these particular features of organization more was accomplished in this period of reorganization than had been accomplished in the whole previous history of the Medical Department. Secretary Daniels was deeply interested in the legislation necessary to secure these results, realizing not alone what it would mean in peace time but especially in the event of war.

In 1918 the members of the Medical Reserve Corps were listed for mobilization in accordance with their expressed willingness to serve in case of war, and a correspondence course was established for their education in naval matters. A similar course was provided for medical officers of the naval militia. Later, when the Medical Reserve Force was created by Act of Congress, August 29, 1916, because of the rapidity with which medical officers could in this way be inducted into service and obligated to perform any duty, enrollment in the Reserve Force was carried on in preference to appointment in the Medical Reserve Corps which was subsequently abolished. The physical records of retired medical officers were studied with a view to determining those who might be available for active service, and mobilization points were designated for those selected. These officers actually reported for duty the day war was declared, in response to telegraphic orders.

In view of the Act of Congress of July 1, 1902, which authorized the President to employ the Public Health and Marine Hospital Service in time of threatened or actual war, for service under the Army or Navy, plans were laid to utilize both the personnel and the hospital facilities of the U. S. Public Health Service in the event of war. The President exercised this authority by Executive Order of April 3, 1917.

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With a view to preparing in advance for the active cooperation of the American Red Cross, authority to detail medical officers of the Navy to that organization was requested and granted by Act of Congress, August 29, 1916.

Early in 1916, on the possibility that the United States might enter the World War, an estimate of the situation was made and charts were drawn up to indicate places where medical department personnel would be needed—medical officers, dental surgeons, nurses and hospital corpsmen. All personnel available at that time, including members of the Medical Reserve Corps, retired officers, and medical officers of the Naval Militia, were listed for mobilization.

In October of 1916 the Bureau of Medicine and Surgery made a survey of 144,000 physicians in the United States for the purpose of determining their eligibility for service in the regular medical corps. More than 7,000 of these were individually circularized. In addition, the coöperation of medical colleges was sought. While this work did not lead to an immediate increase in the number of applicants it did familiarize medical men with the service and its needs and resulted in a sufficient number of applications when war came to meet our needs throughout. Early in 1917, with war in prospect, the enrollment of medical and dental officers in the Naval Reserve Force was conducted rapidly by special examiners. The Dental Corps of the Navy was created by Act of Congress, August 22, 1912. This was an important provision and has done much to aid in promoting physical efficiency of the personnel.

Prior to the declaration of war special parties were sent out to recruit for the hospital corps. Hospital corps schools were established at the Naval Training Station, Newport, R. I. (1914) and at the Training Station, San Francisco (1915). A third school was established at Great Lakes in January, 1917, and later, when the Naval Operating Base at Hampton Roads, Va., was ready to begin the training of enlisted personnel, a fourth and finely equipped school was located there.

On July 27, 1915, in accordance with Navy Department confidential instructions dated May 28, 1915, following a letter from the General Board to the Department, the Bureau reported to the Department in detail its plans for rapid expansion of personnel, enlargement of hospitals, construction of hospitals of the emergency type, utilization of Public Health Service hospitals, arrangements to be made for the care of naval patients in civil hospitals where necessary, as well as data concerning the various civil hospitals and the number of beds available. Specifications were presented for the quick conversion of merchant ships to be used as hospital ships, ambulance ships or medical transports. The initial requirements for medical and surgical material and Medical

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Department supplies of all kinds were stated and probable requirements for the subsequent periods of a war were discussed together with sources of supply and amounts available with the time necessary for delivery. Detailed plans for the purchase, delivery and inspection of such supplies were described.

Thereafter, reports of preparations necessary to insure a state of preparedness for war were made quarterly to the Department. The preparations of the Medical Department progressed without interruption.

In conjunction with the Bureau of Yards and Docks and the Office of Naval Intelligence plans were prepared for the construction of prison camps, and early in 1916 possible sites, including government owned land at Greensborough Neck, Annapolis, Md., were inspected.

In 1916 the war slate for naval districts was revised. Adequate and uniform plans were made for medical department organization in each district. A survey of hospitals and other institutions which could be converted into hospitals, was completed and the institutions were listed according to naval districts. Naval hospital base units were organized under the auspices of the American Red Cross which also undertook the development of nursing units and the enrollment of graduate nurses for service in the Navy. Early in 1917 district organization was completed. The medical department was divided into two general classes, (*a*) Division of Dispensary Service (field and local service) and (*b*) Hospital Service (central). A senior medical officer was detailed as Medical Aid to the Commandant of each Naval District to supervise all medical department activities in the district other than those belonging to the Hospital Service. The Medical Officer in command of the Naval Hospital was designated as Director of Hospital Service in charge of the Naval Hospital Base, with supervision of the care of all patients transferred to hospital. His duties included arrangements with civil institutions for the care of navy patients when necessary; general supervision over their care and treatment under such circumstances, and development of naval base hospital facilities to meet growing needs. His duties required coöperation with the Medical Aid to the Commandant for the complete coördination of all medical department activities under close supervision of the Bureau of Medicine and Surgery.

General expansion of naval hospital facilities began in 1909 with the construction of permanent buildings of the finest type at Portsmouth N. H., Chelsea, Mass., Newport, R. I., and at Puget Sound together with the enlargement and modernizing of the hospitals at Norfolk, Philadelphia, New York, and Mare Island. The hospitals at Annapolis, Md.,

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and Washington, D. C., were begun in 1904. All of these main hospitals on both coasts were designed to serve as hospital bases, and they were definitely planned so that the capacity of each could be increased rapidly by the use of tents or construction of temporary wards should occasion require. Special provision was made late in 1916 for enlargement of the naval hospitals at New York, Norfolk, Mare Island, Puget Sound, and Pearl Harbor.

Plans had been drawn in 1913 for hospitals of an emergency type. Small scale plans with specifications were completed in June, 1913. These covered buildings comprising a complete hospital unit to be set up wherever the need for additional hospitals might be demonstrated in the event of war. The plot plans of certain naval hospital reservations were also laid out so that drawings would be available in case of war to show exactly where ward buildings of the emergency type were to be erected.

The emergency hospitals were designed so that each could be increased from a small unit to a total of 5,000 hospital beds if necessary. The plans were very carefully worked up from a study of hospital camp conditions and the probable needs of the Navy. Later developments proved that the original layouts would have been entirely satisfactory. However, when the United States entered the World War it was found that owing to the shortage of lumber of certain dimensions, material could be obtained more readily and that construction would proceed more rapidly and economically if the plans were modified. The 500 bed camps constructed in the early months of the war were all comprised of one story buildings whereas the original plans called for two-story ward buildings. Some improvements were made in the later hospitals but it may be said of all that no finer hospitals of an emergency type could be expected, and in certain respects, so far as the comfort and treatment of patients is concerned, they were even superior to the best permanent hospitals.

With the exception of the Naval Hospital at Cape May, N. J., additional construction at New London, Conn., and the unit put up on Ward's Island, New York, all of the emergency hospitals in the United States were built on government owned land.

It is safe to say that when war became imminent the United States had the most magnificent system of naval base hospitals in the world on a peace-time basis, and to meet war conditions it was only necessary to complete the emergency construction already planned. During the year previous to mobilization a large amount of tentage was procured and distributed among the various hospitals to be stowed away in order that a sufficient number of tents might be available for immediate

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increase of bed capacity wherever required in case of necessity. Additional hospital beds were also supplied so that by utilizing extra space in hospital buildings not ordinarily needed for beds, as well as in tents, the bed capacity of these base hospitals could be increased nearly 100 per cent at once. Hospital store rooms were filled with reserve stocks of medical and surgical supplies to meet any demand that might come. Moreover, vessels of the Navy in commission were furnished greatly increased quantities of medical supplies.

Several years before the war the Bureau of Medicine and Surgery began gradually to accumulate medical and surgical supplies and Medical Department equipment generally, in reserve, the aim being to carry at all times in the principal medical supply depot at Brooklyn, excess stocks equivalent to the demands of one peace-time year. When war broke out in Europe this one year's reserve supply was increased by large purchases without waiting for special appropriations because it was realized that the United States was then largely dependent upon Europe for goods of that character and that much time would be required for their manufacture in this country. The necessity for this large reserve supply was explained to the naval committees and specific authorization to proceed with the purchase was secured from Congress in the Naval Act of August 29, 1916. Through this forethought the Medical Department not only had abundant supplies of medical and surgical stores on hand at the beginning of the war, but there were already in force contracts so drawn that the Bureau could purchase without waiting for new bids, and could procure without delay, all stores and equipment needed for the medical outfits of the many additional vessels secured by the Navy Department and converted for naval purposes. In the same manner the new hospitals and the many dispensaries established at numerous training camps and stations were promptly supplied and equipped. Supplies for "overseas" were invariably furnished in the full quantities requested without delay. Important supplies were duplicated and sometimes triplicated by separate shipments to make good in advance possible losses through the sinking of vessels by the enemy. In some instances stores and personnel were assembled and held ready awaiting word from London. Bureau instructions were to furnish anything requested from London at once without waiting for explanation. In no instance during the war was any ship or station delayed in being placed in active service because of the lack of or delay in the shipment of medical and surgical supplies. London headquarters was authorized to purchase abroad in advance of approval any stores or supplies needed.

Because of these preparations the Medical Department passed

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quietly from a peace to a war footing on April 6, 1917. A few more clerks and four or five additional officers were taken into the Bureau of Medicine and Surgery but no radical changes in organization were necessary.

I went to the Secretary and explained the necessity for immediate action with regard to emergency hospital construction. He realized the situation and our plans received instant approval.

By authorizing the technical charge of cost against a small contingent appropriation the Secretary made it possible for me to go ahead with our building operations without awaiting the sanction of Congress, of which we felt assured, but which was not actually given until the passage of the Appropriation Act of June 15, 1917. By that time we had under way, and some of it nearing completion, millions of dollars worth of hospital buildings in many places. This prompt action before material and labor costs had advanced saved a great deal of money as well as time. By autumn the first chain of new emergency hospitals was ready for use, including those at League Island, Pa., Charleston, S. C., Cape May, N. J., and Pensacola, Fla. At the same time additional temporary wards were ready for occupancy at Portsmouth, N. H., Newport, R. I., Norfolk, Va., and Great Lakes, Ill., so that the first winter of the war was approached with considerable assurance. A little later, additions were made to the base hospitals at Chelsea, Mass., Philadelphia, Pa., Mare Island, Cal., and Puget Sound, Wash. New hospitals were built at Pelham Bay Park, N. Y., New London, Conn., Hampton Roads, Va., and Key West, Fla. United States naval hospitals were also established in Europe.

In brief, the expansion of naval hospital facilities continued steadily throughout the war to keep pace with the growing strength of the Navy, which finally exceeded 600,000 in total personnel by November, 1918. Eventually, naval hospitals were increased in number from seventeen to forty three; thirteen of which were located in Europe, including five base hospital units which were organized early in the war.

The hospitals abroad were fitted out with the most modern equipment, most of which, such as operating room appliances, laundry machinery, sterilizers, etc., was sent from the United States.

By January 1, 1918, the total bed capacity had increased from 3,850 to 15,689. Before the war was over the number of hospital beds available reached a total of more than 19,000. This figure included our hospitals all over the world and 817 beds in three hospital ships.

About the middle of 1917 in view of the increasing activities of our Navy in the war zone and the realization that these would increase as fast as new personnel could be trained, and also on account of the possi-

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bility of a fleet action in which one division at least of the United States fleet would take part with the main British fleet, it was recommended that two base hospitals be established in England or Scotland. This allocation was finally approved abroad and two base hospital units were immediately mobilized. They were held ready pending arrangements for their establishment in the British Isles. The Commanding Officer of one unit was sent abroad to complete arrangements. After some delay a unit was located in Strathpeffer, Scotland, within easy communication with the main fleet and the bases utilized by the North Sea Mining Groups. This hospital was magnificently located and splendidly equipped, and it proved to be of great service to the British Navy as well as to our own forces.

Later the second base hospital unit which had been mobilized and was being held in Philadelphia awaiting orders, was located at Leith, Scotland, near one of the North Sea bases. The third hospital was located at Queenstown, Ireland, where our main patrol fleet was based. The bureau's first recommendation that these hospitals be established at once was disapproved July 18, 1917 by the Commander of United States Naval Forces operating in European waters on the ground that there would probably not be any demand for these base hospitals, at least not within the year. After correspondence relative to the contemplated expansion of our forces operating in European waters and the anticipated delay in locating and commissioning them both hospitals were finally placed in operation. Pending the establishment of a base hospital at Queenstown the bureau recommended that a hospital ship be sent to that port in view of the fact that complements amounting to 12,000 men were to base there on ships and ashore. We had additional personnel located in Ireland at aviation and balloon stations. This plan was rejected abroad on the ground that the harbor was too crowded and a hospital ship was not needed.

Early in the war two base hospital units were established at Brest, France, where they did fine work throughout, one of them exclusively for army patients. The personnel of these units, organized under the auspices of the American Red Cross and enrolled in the Naval Reserve Force under the command of regular medical officers of the Navy, rendered splendid service and are deserving of great credit. Other units were organized but their services were not required. Twenty-five station hospital units consisting of medical and nursing personnel only were organized in conjunction with the American Red Cross to supplement the personnel at naval hospital bases. Ten of these were called to duty and served during the war.

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With regard to hospital ships, we had the U.S.S. *Solace* in commission at the beginning of the war and we had a new hospital ship under construction at the Philadelphia Navy Yard designed and planned for the purpose by the Bureau of Construction and Repair in coöperation with the Bureau of Medicine and Surgery. In 1916 the Board of Inspection and Survey having inspected the steamships *Saratoga*, *Havana* and *Mexico* of the New York and Cuban Mail Steamship Company, these vessels were designated to be assigned to the Medical Department in the event of war, and detailed plans were prepared for their quick conversion for hospital ship purposes. At the same time all details relating to their complements and equipment were worked out. Plans had been drawn previously, in 1914, for conversion of the *Havana*, *Mexico*, *Saratoga*, and also of the *Morro Castle*, a somewhat smaller vessel of the same line. For service in the Pacific Ocean the Bureau requested in 1916 that the *Sierra*, *Sonoma* and *Ventura* be designated for conversion into hospital ships. After war was declared the *Havana* and *Saratoga* were converted in accordance with these plans at the New York Navy Yard, the former becoming the U.S.S. *Comfort* and the latter, the U.S.S. *Mercy*. These vessels relieved the *Solace* in taking care of the needs of the Atlantic fleet and they were ready in time to meet other demands. They proved to be excellent hospital ships in so far as merchant ships can be made to serve the purpose.

To go back to the beginning of the war; we had many anxious moments, of course, but on the whole our work went on without confusion. After the declaration of war we received plenty of applications for the medical corps but it was a difficult matter to induct medical officers and train them fast enough to meet the needs of the rapidly expanding Navy. The demand for officers of sufficient experience and training to render them capable of assuming independent duties, was very great, especially as the care of the sick at base hospitals and at training stations and camps was fast becoming a tremendous undertaking owing to the mounting numbers of unseasoned men undergoing intensive training. These not only brought communicable diseases into the service with them from civil communities but they were, like all untrained and undisciplined recruits, peculiarly susceptible to disease.

By shortening the course at the U. S. Naval Medical School, class after class of new medical officers received sufficient preliminary instruction in naval medical matters to fit them for duty at naval hospitals where with practical experience they were rapidly fitted to perform duty at operating stations and at sea. Advantage was also taken of the offers of various medical schools to provide special courses of instruction. Many men of previous training in the various specialties of medicine

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rendered splendid service in the Navy along their special lines of work. Some of the most eminent practitioners in the country entered the Naval Reserve Force and served in this way both independently and in connection with hospital units. Medical officers on active duty increased from 353 at the outbreak of war to 3,093 as follows: regular, 829; temporary, 429; reserve, 1,720; retired, 98; acting assistant surgeons, 3; Public Health Service, 16. Dental officers increased from 34 to 485—122 regulars and 363 reserves.

The Hospital Corps of the Navy was increased from 2,000 to 16,564. The urgent necessity of expanding this corps to enormous proportions, at once, presented problems of peculiar perplexity. Fortunately, young men of splendid character and excellent ability entered the corps in large numbers and it was therefore possible to train them much more rapidly than under ordinary circumstances. The establishment of hospital corps schools has already been mentioned. In view of the special training required and the diverse duties which must be performed skillfully by these men the enlargement of the corps fast enough to provide for all needs ashore and afloat, must be regarded as one of the great accomplishments of the Medical Department.

With war imminent the coöperation of the United States Public Health Service was requested by the Secretary of the Navy and assured by the Secretary of the Treasury. Arrangements were then made to take over the medical personnel attached to Coast Guard vessels and for the use of Public Health Service hospitals in case of need.

Shortly after the beginning of the war, in addition to those serving on board coast guard vessels thirteen officers of the Public Health Service including some of their most experienced and expert members were detailed to serve in the Navy during the war. One was assigned to each naval district where he was of the greatest possible assistance to the medical aid to the commandant whom he was able to relieve of a great burden of work in connection with the sanitation of the rapidly growing stations and outlying section bases, and in the enforcement of measures for the prevention and control of disease. This arrangement proved to be a very fortunate one. With the sanitation officer acting as assistant to the medical aid to the commandant, whose time was almost completely consumed with manifold duties relating to the movements of personnel and development of medical department activities for the care of the sick, the medical aid was enabled constantly to keep in touch with conditions in all parts of his district. In this way preventive medicine was completely coördinated with curative medicine. It is believed, therefore, that our plan of district medical organization is beyond criticism.

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Two of the most expert officers of the Public Health Service, with wide experience in public health organization and sanitation matters of all kinds, were detailed to the Bureau of Medicine and Surgery and assigned to the Division of Sanitation, organized under the direction of a medical officer of the Navy, who was thus enabled to avail himself at all times of the most competent advice and assistance. Intimate relations were quickly established with the Bureau of the Public Health Service and in this way the staff of the Bureau as well as the personnel at the Hygienic Laboratory were constantly available for purposes of consultation in addition to the staff of the U. S. Naval Medical School.

The Bureau of Medicine and Surgery supervised the work of the Medical Department in the field, and studied the many problems which constantly arose in connection with the expansion of naval stations and the new ones which were being developed. Particular attention was paid to housing and housing standards for barracks and other habitations, water supplies, environmental conditions, and sanitation matters in general, together with measures for the prevention of communicable diseases. The department, and the service at large as well, was informed each week of health conditions in the Navy. Weekly bulletins were issued containing information and instructions for medical officers, many of whom had not had instruction or experience in civil practice along the lines of preventive medicine and sanitation.

During the first year of the war when we were almost swamped with our own work the Secretary sent for me and told me that the Navy would take over the transport service for the Army. For the moment I did not see how we could do more than we were doing but the Secretary said we were all in the war together to win and that I must do everything possible to help General Gorgas.

We went to work on this problem at once and our experience with ship sanitation and medical department organization afloat made it comparatively easy to develop plans for safe-guarding the health of troops in Navy transports and for the installation of ample medical and surgical facilities for these ships as fast as they were turned over to the Navy for alteration. Never in the history of warfare has there been such a movement of troops so well taken care of, their health protected in every possible manner, every detail of sanitation receiving strict attention and elaborate provisions being made for the care of the sick and wounded with special provisions for the safety of the insane. In fact the larger vessels were regarded as combined transports and hospital ships. This work was taken over and performed entirely by the Medical Department of the Navy without extra appropriations and without expense to the Army.

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Hospital ships were not to be had because it was decided early in the war that military-naval desiderations precluded the possibility of assigning ships specially for transportation of the sick and wounded. The Bureau of Medicine and Surgery therefore planned accordingly, well in advance of needs, to meet all contingencies with Navy transport facilities. The provisions made proved ample, not only for the care of the casual sick of troops in transit, but for the actual return of 151,649 army sick, wounded, and insane; 4,395 Navy and 3,626 Marine, from the expeditionary forces in France alone. By the time the armistice was signed, plans had been completed for accommodations in Navy transports already in commission, about to be commissioned and under construction to bring back from Europe 30,000 sick and wounded per month. This figure includes 15,000 bed patients. These were the estimated requirements for an army of five million men. Inasmuch as the number of men who reached France did not greatly exceed two million, the figures show how ample the provisions were. Moreover, these accommodations represented but 80 per cent of the total available, 20 per cent having been reserved for naval personnel.

Another undertaking about which not so much has been heard was the work of the Medical Department in connection with the Naval Overseas Transportation Service which eventually included more than 350 cargo vessels. The Medical Department organization for this service alone assumed large proportions.

Much might be said of the work of the Medical Department of the Navy in many parts of Europe. Dispensaries and hospitals were established in the eastern Mediterranean district, at Corfu in Italy, France, Gibraltar and the Azores, to care for the health of United States Naval personnel which in all finally approximated 75,000 officers and men, including Marine forces numbering more than 28,000. Nothing need be said of the Marines except to remind you that in all of their splendid work the Medical Department of the Navy participated. The medical and surgical equipment supplied them was of the highest order and was furnished in advance and in quantities greater than were used.

Among miscellaneous activities the Bureau of Medicine and Surgery did pioneer work so far as the Navy is concerned in making preparations for defense against poison warfare gases, and undertook the instruction of personnel ashore and afloat including marines detailed for France. A laboratory was established early at the U. S. Naval Medical School for the study and future study of warfare gases, and a series of bulletins, both confidential and non-confidential, was issued by the bureau for the instruction of naval personnel. One of these bulletins contained drill regulations. Later, the excellent Navy gas mask was designed by

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the Bureau of Construction and Repair in coöperation with the Bureau of Medicine and Surgery.

At the beginning of the war in connection with the prevention and control of communicable diseases the Bureau enlarged and extended the diagnostic laboratories at naval hospitals and established completely equipped laboratories where required to serve naval district needs. At the naval training stations and larger camps laboratories were provided for an extensive range of scientific work and a highly trained laboratory personnel was quickly developed. In addition the U. S. Naval Medical School organized, equipped and trained the personnel of three mobile laboratory units which were dispatched repeatedly upon short notice to various stations to supplement existing facilities or to provide the laboratory measures necessary for the prompt control of such diseases as diphtheria, cerebro-spinal fever, pneumonia, and other carrier-borne diseases. In the early days of the war, as planned in advance, good use was made of the laboratory car of the U. S. Public Health Service. This was during the initial period of expansion at the Naval Training Station, Great Lakes, Ill.

Special preparations were made to care for the dead. Supplies of caskets were procured in advance of the war and stored in naval hospitals, and during the war all transports were furnished with a sufficient number to meet probable needs. Special instruction in embalming was provided for selected members of the hospital corps and rigid instructions were issued throughout the service relative to the care and disposal of the dead. The bureau has received many appreciative letters from bereaved relatives for the pains taken in this respect. At the present time due to preparations in advance we have brought home almost all of our dead from Archangel to Africa with the exception of marines buried in the zone of the Army in France.

For the first year of the war the percentage of sickness and the admission rates for disease were lower than for peace-time years. April 1, 1918, the Bureau was already planning preventive measures for the control of disease to meet conditions of the next winter and was receiving the full coöperation of other Bureaus to that end. The pandemic of influenza in the autumn of 1918 spoiled our record but in spite of the frightfully severe types of pneumonia which accompanied that disease and the deplorable number of deaths, the Navy escaped lightly in comparison with the disastrous consequences of epidemics in many countries including the United States, when it is considered that a large majority of all persons in the Navy were in the age groups that everywhere showed the highest death rates. The death rate of the Navy from disease for the period of the war was 8.8 per annum per thousand of total

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strength, the lowest death rate ever recorded for the military or naval forces of the United States in actual war lasting through all seasons of the year.

In looking back, with the record of this war before us, it is extremely doubtful if our work could have been done very differently or any better if it had to be done over again. Both in making provisions for preparedness and during the war the deep interest of the Secretary was very helpful to me. He never failed to approve of my recommendations when our needs were fully placed before him and he helped me to put into effect as promptly as possible everything that could be done to make the work of the Medical Department more effective. Indeed, his advice and suggestions were frequently of the greatest assistance.

In conclusion it should be said that the credit for the successful conduct of the Medical Department of the Navy in the World War belongs in great part to our trained personnel which must be maintained on an adequate basis if there is to be future preparedness for war in time of peace.

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PROCEEDINGS OF THE TWENTY-EIGHTH ANNUAL MEETING OF THE ASSOCIATION OF MILITARY SURGEONS OF THE UNITED STATES, NEW ORLEANS, LA., APRIL 22-24, 1920, HOTEL GRUNEWALD

MINUTES OF MEETING

The twenty-eighth annual meeting of The Association of Military Surgeons of the United States convened at New Orleans, La., April 22, with Lieut. Col. Joseph A. Hall, M. C., N. G., U. S. (Ohio), in the chair.

The order of procedure was as follows:

Opening Meeting, 9.00 *a. m.*

1. Report of Executive Council.
2. Appointment of Nominating Committee, Auditing Committee, Committee on Resolutions.
3. Report of Secretary-Treasurer.
4. Boards of Award.
5. Consideration of Amendments to Constitution and By-laws.
6. Address of the President.
7. Addresses:

"Emergency Measures in Malaria Control," Surgeon L. B. Frick, U. S. P. H. S.

"Activities of the Air Medical Service and the Flight Surgeon," Lieut. Col. Robert A. Strong, M. R. C., U. S. A.

8. Miscellaneous Business.

Second Session, 2.00 *p. m.*

1. Report of Necrology Committee, and Committee on Formation of Local Chapters.
2. Addresses:

"Training of the Enlisted Men of the Medical Department," Lieut. Col. Gustavus M. Blech, M. C., Ill. N. G.

"Some of the Lessons of the War Which are Applicable to Civil Practice," Dr. John Smyth.

"Some Commonly Misapprehended Points in the Diagnosis of Pellagra," Surgeon Joseph Goldberger, U. S. P. H. S.

Third Session, 8.00 *p. m.*

1. Motion Pictures Illustrating: "Technique Used at the Pennsylvania Hospital in the Treatment of Infections and Infected Wounds with Dichloramine-T"; "The Carrel Technique in the Treatment of Infections of the Bones and Joints."

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2. Addresses:

"Chronic Prostatitis and Urethritis Dependent upon Colon Bacillus Infection," Dr. C. E. Verdier.

"Physiotherapy at the U. S. Naval Hospital, New York, N. Y.," Capts. C. H. T. Lowndes, F. E. McCullough, A. M. Fauntleroy, M. C., U. S. Navy, and Commander William Seaman Bainbridge, M. C., U. S. N. R. F.

FRIDAY, APRIL 23

Fourth Session, 9.00 *a. m.*

1. Addresses:

"Neurologic Service in Naval Hospitals," Lieut. Commander R. F. Sheehan, M. C., U. S. Navy.

"The Practical Aspects of Trachoma and Its Control," Surgeon John McMullen, U. S. P. H. S.

"Why a Sanitary Train?" A. A. Surg. Wilbur S. Conkling, U. S. P. H. S. (read by title).

Fifth Session, 2.00 *p. m.*

1. Addresses:

"The Founding of This Association and Its Founder as I Knew Him. An Anecdotal Sketch of Professor Doctor Nicholas Senn," Dr. Horace M. Brown.

"The Results of Wound Excision and Suture," Lieut. Col. Martin B. Tinker, M. R. C., U. S. A.

"The Future of Psychiatry in the Army," Col. T. W. Salmon, M. R. C., U. S. A.

Sixth Session, 8.00 *p. m.*

1. Addresses:

"Impressions gathered from the Experiences in the Great War from the Surgery of the Vascular System," Maj. Rudolph Matas, M. C., U. S. Army.

"Types of Motor Ambulances Observed Abroad," Capt. F. L. Pleadwell, M. C., U. S. Navy.

SATURDAY, APRIL 24

Seventh Session, 9.00 *a. m.*

1. Report of Nominating Committee.
2. Election of Officers.
3. Address:

"Modern Military Medical and Surgical Reconstruction and the Measures of Coöperation Practiced in Relation to the Federal Board for Vocational Education, Regarding Discharged Compensable Disabled Soldiers," Col. Frank Billings, M. R. C., U. S. Army.

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4. Installation of Officers and Reports of Committees.
5. Unfinished Business.

Adjournment.

The headquarters of The Association were at the Hotel Grunewald, and the meetings were held in the Green Room there.

The meeting was called to order by the president. The following reports were then read by the secretary:

REPORT OF THE EXECUTIVE COUNCIL

During the period, October 1, 1919, to April 21, 1920, there were six meetings of the Executive Council, as follows:

October 12, 1919, meeting held at Army and Navy Club, Washington, D. C.
November 28, 1919, meeting called by mail.
January 6, 1920, meeting called by mail.
January 15, 1920, meeting called by mail.
February 14, 1920, meeting held at Army and Navy Club, Washington, D. C.
April 21, 1920, meeting held at Hotel Grunewald, New Orleans, La.

At the last meeting of the Council, the question of the proposed amendment to the Constitution was considered. The amendment referred to was put before the Association at the last annual meeting with favorable recommendation by the Executive Council. The Executive Council at the last meeting voted to rescind the recommendation to that part of the proposed amendment to the Constitution reading, "Article 3, Section 2: Add as a 6th Classification the following: All Medical Members and Medical Examiners of Local, Medical Advisory and District Boards officially appointed by the President of the United States, the Provost Marshal General of the United States Army and the Governors of the Various States for the purposes of the Selective Draft Act."

The following letter from Col. F. A. Winter, M.C., U.S.A., was read at the last meeting of the Council and upon motion, which was duly seconded, his resignation was accepted.

HEADQUARTERS SOUTHERN DEPARTMENT

OFFICE OF DEPARTMENT SURGEON
FORT SAM HOUSTON, TEXAS

April 5, 1920.

SECRETARY, ASSOCIATION OF MILITARY SURGEONS,
Washington, D. C.

Sir:

I beg to tender my resignation as third vice-president of the Association of Military Surgeons, to take effect immediately.

F. A. WINTER,
Colonel, Medical Corps, U. S. A.

The Council then elected Col. Charles Lynch, M. C., U. S. Army, to succeed Colonel Winter for the unexpired term of his office in accordance with the provisions of the Constitution and By-laws.

REPORT OF SECRETARY-TREASURER

Mr. President, and Members of the Association of Military Surgeons:

I submit herewith a report of the activities of the office of Secretary-Treasurer for the period from October 1, 1919, to April 15, 1920. During the months of Octo-

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ber and November, 1919, there was an unusually large number of resignations from the Association, almost all of which fell among those who had come in from the camps at Greenleaf and Benjamin Harrison. Since that time the resignations have been much less, and the number of those applying for membership has been in excess so that with the exception of that period, the progress of the Association has been forward. The figures in regard to the resignations and new members are as follows: Resignations October 1, 1919, to April 15, 1920, 322; new members, October 1, 1919, to April 15, 1920, 514.

Every effort has been made in this office to increase the circulation of the journal, and it is believed that everything possible along this line has been done with the clerical force available. Letters were sent to every medical officer whose discharge from the service was noted in the lists of the *Journal of the American Medical Association*, and other propaganda work was also carried on. While the results from this were not as substantial as might have been hoped, they were sufficient to make the work of benefit to the Association. There has been a natural period of reaction after the close of hostilities, and it was to be expected that the interest, which was at high-water mark during the time of our active participation in the war, should ebb somewhat upon the signing of the armistice. The policy of the journal has not been changed, and it is believed that it is useful in its present form. Its relation with the Regular Services is firmly established, and as an evidence of this I quote the following letter from the Chief of Staff of the Army:

"War Department
"Office of the Chief of Staff
"Washington

March 3, 1920.

"From: The Chief of Staff.
"To Association of Military Surgeons,
(Through the Surgeon General of the Army.)
"Subject. Officers' Reserve Corps.

"1. During the process of demobilization, the strength of the newly built Officers' Reserve Corps has reached approximately 75,000 officers of all grades and arms. These officers are a valuable asset to the military establishment and the stimulation of their interest in military matters, including such instruction as it is practicable to give them, is desired by the War Department.

"2. Pending the enactment and carrying into effect of legislation for the reorganization of the army, it is impracticable for the War Department to announce details relative to the organization and instruction of the Reserve Corps and the obligations, privileges and promotion of its members. In the meantime, it is suggested that reserve officers be given such information and instruction as is possible through the various service publications.

"3. There are now in existence, or in the process of formation, associations of officers of various arms of the service. It is understood that reserve officers are eligible and welcome to membership in these associations. The latter offer an existing and effective means of furthering close affiliation of regular and reserve officers and of furnishing instructive and informative matter to the Reserve.

"4. Established service associations can probably provide for occasional semsocial local gatherings of regular and reserve officers, which gatherings will serve to bring about acquaintance and better understanding among all officers.

"5. The Department has noted your efforts to encourage reserve officers to become members of The Association of Military Surgeons and trusts that such efforts

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will be continued and all reasonable steps taken by you to further the morale and instruction of reserve officers. The value of "The Military Surgeon" as a medium for the transmission of informative and instructive matter to reserve officers is fully appreciated. These efforts are approved by the War Department.

"(Signed) PEYTON C. MARCH,
"General, Chief of Staff."

In accordance with the action of the Association at the last annual meeting announcement was sent to the honorary members who were elected and also certificates of membership in the Association. Acknowledgments of almost all of these have been received and are on file in the office. The business of the office has had to be carried on with an increasing burden of expense in view of the constantly rising schedule of prices. The contract for printing has increased 30 per cent during the past year and for engraving proportionately, while other supplies necessary also cost more. In view of this fact it has been found necessary to exercise careful economy in the management of the affairs of the Association and, due to that, the condition of the Association is one of financial soundness. The work of the Association, as far as the secretary's duties are concerned, is up to date with nothing outstanding except the ordinary monthly routine work.

It is the purpose of the secretary to advance the membership in the Association so far as possible to do so from his office, and it is recognized as a self-evident fact that the majority of this work should fall on his shoulders. It is beyond a question of doubt, however, that much additional work might be done by the individual members of the Association if they would bear this matter in mind and each one take upon himself a certain amount of responsibility along these lines. The personal element in setting forth the advantages of membership in the Association in securing new members plays a large part, and it is believed that, if this fact were taken into consideration by those who make up the Association, the increase in membership might be much more rapid than if left entirely in the hands of the secretary. At each yearly meeting there are many promises of assistance along just these lines, but, alas, the majority of them are apparently forgotten at the close of the meeting and do not materialize in the succeeding months in any visible or tangible form.

Our president has already dwelt on this question in his very able opening address, and it is my sincere hope that this year at least the membership may give some heed to his appeal and assist in pushing forward the affairs of the Association.

The Association is one which is gaining in importance and dignity, and, if it is worth while to belong to it, it is certainly equally worth while to see that it is assured of steady, onward progress.

As treasurer of the Association I submit the following as a statement of the affairs of that office. This report has been audited by two members of the Association, one from the Navy and one from the Army, who were appointed for this purpose by the Executive Council.

Receipts

Admission fees	$2,256.00
Annual dues	6,624.43
Subscriptions	915.46
Advertising	7,333.86
Miscellaneous (including sale reprints and insignia)	1,809.72
Total receipts	$18,939.47

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Cash balance, October 1, 1919	$1,405.67
Grand total	20,345.14
Less disbursements	18,121.62
Cash balance, April 16, 1920	$2,223.52

Disbursements

Printing journal	$10,900.60
Salaries and commissions	3,156.01
Postage	1,069.70
Stationery and printing	861.68
Cost of reprints	675.81
Telephone	57.89
Dishonored checks	30.75
Expenses of meetings	972.12
Miscellaneous (including cost of insignia, car fare, certificates of membership, etc)	397.06
Total disbursements	$18,121.62

Assets, April 16, 1920

U. S. Bonds, Third Liberty 4¼ per cent Converted	$15,000.00
U. S. Bonds, Fourth Liberty 4¼ per cent	4,000.00
U. S. Bonds, Victory 4¾ per cent	6,000.00
Balance on deposit Union Trust Company	576.25
Balance on deposit National Bank of Washington	2,223.52
Total	$27,799.77

Finally, I wish to express to the president and the Executive Council my thanks for their sympathetic cooperation and confidence in my efforts as an officer of the Association.

JAMES ROBB CHURCH,
Colonel, Medical Corps, U. S. Army,
Secretary-Treasurer.

THE SECRETARY: At a recent meeting of the Executive Council of The Association of Military Surgeons the following nominations for honorary membership in the Association were brought before the Council, and it was recommended that their names be proposed before the Association at this annual meeting for election:

ENGLAND

Colonel E. M. Pilcher, C.B., C.B.E., M.B., D.S.O., F.R.C.S., K.H.S.
Colonel H. J. Waring, C.B.E.
Dr. Norman Walker.

CANADA

Major General J. T. Fotheringham, A.D.G.M.S.
Col. A. Primrose, C.B.
Lieut. Col. A. T. Bazin, D.S.O.
Dr. J. C. Connell.

BELGIUM

Capt. Jules Voncken, Belgian Medical Service.

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CUBA

Major Armando Guerrero y Bruffau, Cuban Army.
Capt. Nicanor Ybarra y Mella, Cuban Army.

FRANCE

Professors Leon Monier, Roussy, Demarest, Gregoire.

Captain Pleadwell moved that the gentlemen named be elected as honorary members of the Association. The motion was carried.

The report of the Committee on the Wellcome Prizes was next presented to the Association. The finding of the committee was as follows:

First Prize to the paper by "Busy Bee."

Second Prize to the paper by "K. K. K."

Honorable Mention to the paper by "Maplewood."

The envelopes containing the true names of the authors were then opened by the president and Col. James L. Bevans, M. C., U. S. Army, was found to be the winner of the First Prize; Capt. K. M. Bowman, M. C., U. S. Army, the Second Prize; and Capt. Frank G. Norbury, M. C., U. S. Army, Honorable Mention.

The proposed amendments to the Constitution and By-laws were next considered.

Proposed Amendment to the Constitution

Article 3, Section 3: add as a 6th classification the following: "All Medical Members and Medical Examiners of Local, Medical Advisory and District Boards officially appointed by the President of the United States, the Provost Marshal General of the United States Army and the Governors of the various States for the purposes of the Selective Draft Act."

Add as a 7th classification the following: "Ex-Medical officers."

Add as an 8th classification the following: "Acting Assistant Surgeons (Contract Surgeons) of the U. S. Army, Navy and Public Health Service."

Section 5 of Article 3: Strike out "1. Ex-Medical officers and." Strike out "5. Acting Asst. Surgeons (Contract Surgeons) of the U. S. Army, Navy and Public Health Service."

Renumber the remaining paragraphs one, two and three.

After the reading of the proposed amendment to the Constitution, the question was thrown open to discussion. Remarks were made by Capt. F. E. McCullough, M. C., U. S. Navy, and Dr. Horace M. Brown, of Milwaukee, after which a motion by Surg. J. W. Kerr that the first paragraph of the proposed amendment (as shown in italics) be stricken out and the amendment then be adopted was duly seconded and carried.

The amendment to the By-laws as presented by the Executive Council was next considered. A motion by Capt. F. L. Pleadwell, M. C., U. S. Navy, seconded by Asst. Surg. Gen. J. C. Perry,

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U. S. P. H. S., was carried and the following amendment ordered written into the records: "That Section 2, Article IV, of the By-laws, be amended to read 'Delinquency for two years shall terminate membership, after due notice by the treasurer,' for two years substitute 'one year.'"

The president then named the following committees:

Nominating Committee

Capt. F. E. McCullough, M. C., U. S. Navy.
Col. James Robb Church, M. C., U. S. Army.
Asst. Surg. Gen. J. C. Perry, U. S. P. H. S.
Col. D. S. Fairchild, M. R. C., U. S. Army.

Auditing Committee

Col. Charles Lynch, M. C., U. S. Army.
Asst. Surg. Gen. J. C. Perry, U. S. P. H. S.

Committee on Resolutions

Capt. F. E. McCullough, M. C., U. S. Navy.
Col. C. R. Robbins, M.C., U. S. Army.
Commander Wm. Seaman Bainbridge, M. C., U. S. N. R. F.

At the conclusion of the business program of the session, our president, Lieut. Col. Joseph A. Hall, M. C., N. G., Ohio, addressed the meeting. (His address appears elsewhere in this issue.) Following the address of the president, a paper by Surg. L. B. Frick, U. S. P. H. S., on "Emergency Measures in Malaria Control" was read and discussed by Surgeon Goldberger, Colonel Lynch, Lieutenant Commander Figueroa, Doctor Brown, Asst. Surg. Gen. J. C. Perry, Lieutenant Colonel Hall, Lieutenant Colonel Robbins. Following the discussion a paper on "Activities of the Air Medical Service and the Flight Surgeon" was read by Lieut. Col. Robert A. Strong, M. R. C., U. S. Army, and discussed by Major Bonham and Commander Bainbridge.

The meeting then adjourned to the session at 2.00 p. m.

At the session at 2 p. m. the report of the Necrology Committee was received standing. The following report of the Committee on Subordinate Organizations was next presented by Lieut. Col. G. M. Blech, M. C., Ill. N. G.:

Your Committee appointed at the St. Louis Meeting to investigate and report on the matter of the formation of state organizations subordinate to the Association of Military Surgeons of the United States desires to make the following recommendation:

1. That the organization of subordinate associations is advisable, the qualifications for membership in which shall be the same as for the parent organization.

2. That these organizations shall be autonomous, excepting that their constitutions and by-laws shall not conflict with those of the parent organization.

3. That a committee be appointed, consisting of a Chairman and two members at large, which shall have authority to add to its number one member from each

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state, and which shall furthermore have authority to proceed with the organization of state branch associations and report at the next meeting of the association.

SAMUEL C. STANTON,
Brigadier General M.C., Ill.N.G. (Ret.).
GUSTAVUS M. BLECH,
Lieutenant Colonel M.C. Ill.N.G.
FRANK L. PLEADWELL,
Captain M.C., U. S. Navy.

The report of the committee was accepted by the Association and the committee discharged.

Colonel Lynch suggested that special resolutions be drawn in the case of Col. John Van R. Hoff and Col. Louis A. La Garde, M. C., U. S. Army, deceased. Thereupon the following committee was appointed to draw up these resolutions: Col. Charles Lynch, M. C., U. S. A.; Capt. F. L. Pleadwell, M. C., U. S. N.; Asst. Surg. Gen. J. C. Perry, U. S. P. H. S.

The following papers were then read and discussed: "Training of the Enlisted Men of the Medical Department," by Lieut. Col. Gustavus M. Blech, M. C., Ill. N. G.; "Some of the Lessons of the War Which are Applicable to Civil Practice," by Dr. John Smyth; and "Some Commonly Misapprehended Points in the Diagnosis of Pellagra," by Surg. Joseph Goldberger, U. S. P. H. S.

The meeting then adjourned until 8.00 p. m.

The third session opened with motion pictures furnished by the Abbott Laboratories. Following this the literary program was carried out as per program.

The fourth session was devoted to the reading and discussing of the following papers:

"Neurologic Service in Naval Hospitals," by Lieut. Comdr. R. F. Sheehan, M. C., U. S. N., and "The Practical Aspects of Trachoma and Its Control," by Surg. John McMullen, U. S. P. H. S. The meeting then adjourned to 2.00 p. m.

Fifth Session, 2.00 p. m.

At this point in the meeting Admiral Braisted, Surgeon General U. S. Navy, introduced the following foreign delegates, who were welcomed by the Association standing: Surg. Rear Admiral Sir Humphrey Davy Rolleston, K. C. B., F. R. C. P., of London, England; Col. H. J. Waring, C. B. E., Member of the Council of the Royal College of Surgeons of England; Dr. Norman Walker, of the Triple Qualification Board of Scotland and Treasurer of the Royal College of Physicians of Edinburgh.

Dr. Horace M. Brown, of Milwaukee, read a paper entitled "The Founding of This Association and Its Founder as I knew Him. An

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Anecdotal Sketch of Professor, Doctor Nicholas Senn." This paper was followed by two papers, one by Lieut. Col. Martin B. Tinker, M. R. C., U. S. A., entitled "The Results of Wound Excision and Suture," and one by Col. T. W. Salmon, M. R. C., U. S. A., entitled "The Future of Psychiatry in the Army." Due to illness of the author, Colonel Salmon's paper was read by Commander William Seaman Bainbridge, M. C., U. S. N. R. F.

Following the reading of these papers, the meeting recessed to 8.00 p. m.

Sixth Session, 8.00 *p. m.*

At the sixth session, the following gentlemen, who were elected to honorary membership at the first session of the meeting, were called before the Association by the secretary, who addressed them as follows and invested them with the badge of the Association in token of their election to membership:

Surgeon Rear Admiral Sir Humphrey Davy Rolleston, K.C.B., F. R.C.P. of London: Although it has for some time been our privilege to count you as a member of our Association, it is, we feel, an added honor that you are here with us today and it is a most gratifying duty that as Secretary, I am permitted to present to you this badge of our Association. I speak for all our members in expressing the hope that among the many honors which have come to you in recognition of your attainments and which may come in the future, this be not altogether forgotten but may serve to remind you of the sincere admiration and respect of this Society, which is very proud to claim you as a member.

Colonel H. J. Waring, C.B.E., Member of the Council of the Royal College of Surgeons of England: Distinguished among distinguished men, member of a body whose name is everywhere known, honorable and honored, tried and trusted in the affairs of your state, it is an honor for me, as Secretary of The Association of Military Surgeons of the United States to advise you of your election as an honorary member of our Society and in token thereof to present you this badge.

Dr. Norman Walker, Triple Qualification Board of Scotland, Treasurer Royal College of Physicians of Edinburgh, an authority in matters of your profession, a welcome guest with a sister nation, we appreciate the honor which devolves on our Society through your association as an honorary member and it is a pleasure to me to present to you this badge of the Association.

Colonel A. Primrose, C.B., Canadian Army Medical Corps: Learned in the doctrines of your profession, skilled in its practice, ripe with the experience gained in the defense of your realm in the far places of the world, it is a pleasant duty for me, as secretary of this Association, to welcome you as a member and to present to you this, our badge.

Lieut. Col. A. T. Bazin, D.S.O., Canadian Army Medical Corps: A tried soldier of the Empire who gave your skill and strength on the bloody fields of Flanders and to whom your country has already said "Well done," we gladly welcome you to membership and in recognition of this offer you this badge of the Association.

Capitaine Jules Voncken du Service de Sante de l'Armee royal Belgique, distingué sur le champ de battaile, ainsi dans le monde des lettres medicales, je me felicite

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de vous saluer comme membre de notre societé et de vous presenter l'insigue de notre organization.

Commandante Medico Armando Guerrero y Bruffau, del Cuerpo de Sanidad, del ejercito de la Repùblica de Cuba, oficial distinguido de los fuerzos armadas de Nuestra Vecina Republica, me felicito al poderle dar la bien venida como miembro de honor de nuestra sociedad y, de presentar a Vd. esta medalla como testimonio de nuestra afecto y admiracion haci a su Patria y a su prestigiosa personalidad.

Subsequent to this a paper by Maj. Rudolph Matas, M. C., U. S. A., entitled "Impressions gathered from the Experiences in the Great War from the Surgery of the Vascular System," and one by Capt. F. L. Pleadwell, M. C., U. S. N., entitled "Types of Motor Ambulances observed Abroad," were read and discussed.

The meeting then adjourned to 9.00 a. m., April 24.

SATURDAY, APRIL 24

Seventh Session, 9.00 *a. m.*

The seventh session opened with the report of the Nominating Committee as follows:

For President: Surgeon J. W. Kerr, U.S.P.H.S.; *For First Vice-President:* Capt. F. L. Pleadwell, M.C., U. S. Navy; *For Second Vice-President:* Col. Charles Lynch, M.C., U. S. Army; *For third Vice-President:* Col. David S. Fairchild, M.R.C., U. S. Army; *For Secretary-Treasurer:* Col. James Robb Church, M.C., U. S. Army. To fill vacancy on the Sinking Fund Committee caused by the death of Col. John Van R. Hoff, U. S. Army: Dr. Geo. T. Vaughan. Regular election of one member: Lieut. Col. Joseph A. Hall, M.C., N.G. U.S. (Ohio).

A motion by General Griffith, that the report of the committee be received as read and that the rules of the Association be suspended and the secretary be instructed to cast his ballot for the entire ticket as read, was duly seconded and carried.

A paper entitled "Modern Military Medical and Surgical Reconstruction and the Measures of Coöperation Practiced in Relation to the Federal Board for Vocational Education, Regarding Discharged Compensable Disabled Soldiers," was read by Col. Frank Billings, M. R. C., U. S. A., and discussed by the members of the Association.

At this time the newly elected president was escorted to the chair by General Griffith. Surgeon Kerr addressed the meeting as follows:

MR. PRESIDENT AND MEMBERS: It hardly seems fitting for me to assume to speak at this time. However, I realize, it is a great honor to be chosen president of this Association and I wish to express my appreciation of this honor. I have a real sense of unworthiness and although I have been a member of the Association for a long time, my duties and relations to it have been of a routine character and there are many far more worthy to become the president. There are many problems confronting us today and as medical officers it is our duty to work with the idea that in the future our government shall be prepared to discharge its obligations in time of war. In the meantime, we should take advantage of all the lessons that have been

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presented to us in time of war and thus better carry on our peace time activities. As a Public Health Officer, I am especially interested, and have been for years, in problems of public health and their solution. I feel that the lessons that have come out of the war will be of great advantage to our country and I feel that this Association can be of great aid in the developing of this work and be of great help to our service. I pledge my best efforts to the development and carrying on of the work of the Association and I ask the members for their whole-hearted coöperation in order that the Association may go forward with its good work.

The Auditing Committee reported that the report of the treasurer had been examined and found correct.

The Committee on Resolutions then introduced the following resolutions, which were read and accepted by the Association:

Resolved: That the Association of Military Surgeons in Annual Session assembled at New Orleans, La., April 22 to 24, 1920, hereby expresses sincere regret at the loss by death of two of its most prominent members—Col. John Van Rensslaer Hoff, Medical Corps, U. S. Army, and Col. Louis Anatole La Garde, M.C., U. S. Army. The former served as president of the Association from 1901 to 1902, and later as secretary and editor of the official journal. The latter filled the office of Secretary and editor *ad interim* from August, 1918, to December, 1918.

Both interested themselves actively in the affairs of the Association from a very early period in its history and both played a prominent part in advancing the interests of the Society.

CHARLES LYNCH,
F. L. PLEADWELL,
J. C. PERRY,
Committee.

Resolved: That the Secretary be instructed to convey the thanks of the Association to Col. Isadore Dyer and Capt. C. E. Verdier for the assistance rendered in arranging the program of this meeting, and to Dr. Oscar Dowling, President of the Louisiana State Board of Health, for his courtesy in furnishing a lantern for the use of the Association at the meeting.

F. E. MCCULLOUGH,
WM. S. BAINBRIDGE,
C. R. ROBBINS,
Committee.

The meeting then adjourned *sine die.*

Doctors Gustave Roussy, E. E. Demarest and Capt. Nicanor Ybarra, who were unable on account of accidents of travel to be present at the time the other honorary members were decorated, were presented with the badge of the Association by Dr. Horace M. Brown, on Tuesday, April 27, at the Hotel Grunewald. The presentations were made with the following citations:

M. LE DOCTEUR GUSTAVE ROUSSY ET M. LE DOCTEUR E. E. DEMAREST:

MESSIEURS: Malheureusement les accidents du voyage ont prive les membres de l'Association des Medecins Militaires des Etats Unis, du privilege et de l'honneur de votre presence aux deliberations pendant la conferance de l'Association la semaine derniere. C'est une perte irremediable pour nous autres.

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Mais, Messieurs, nous vous sommes reconnaissants de l'eclat que pendant la durée de la Guerre vos travaux et vos sacrifices personnels ont jeté sur la profession chirurgicale, non seulement de la France mais aussi du monde entier.

En reconnaissance de cette gloire et de ces sacrifices, nous vous prions d'accepter de faire partie de notre Association, et de contribuer a ses efforts et a ses travaux comme membres honoraires de "The Association of Military Surgeons of the United States.

En temoignage de notre desir, nous vous prions de bien vouloir accepter l'insigne de notre Societe.

SEÑOR CAPITAN NICANOR YBARRA Y MELLA:

SENOR: Las relaciones que existen ahora entre la Republica de Cuba y los Estados Unidos son del caracter mas intimo; y sobre todo los lazos que unen al mundo cientifico, especialmente al de la medicina, están tan firmemente establecidos que usted puede comprender facilmente el deseo de cordialidad que la Asociacion de Cirujanos Militares desea reine entre los hombres de ciencias de las dos Republicas.

Para gratificar este deseo, la Asociacion de Cirujanos Militares me ha suplicado obtengar de usted nos favorezoan entrando como miembro de la Asociacion, y asi nos beneficir con su valiosa ayuda en nuestras deliberaciones y nos honorer con acceptar una sociedad honoraria en nuestra Asociacion. Con este objeto nos suplicamos a usted accepter bondadosamente de nosotros dicha sociedad asi como la insignia de nuestra Asociacion.

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ADDRESS OF THE PRESIDENT, LIEUTENANT COLONEL JOSEPH A. HALL

Gentlemen of the Association:

It is my duty and pleasant privilege to open this the twenty-eighth annual meeting of the Association of Military Surgeons of the United States and in so doing to address you as the president of the Association.

I am glad of this opportunity, not only because it affords me the chance to express to you the gratification which I feel in standing, for a time, as the official head of a society of the worth and reputation of ours, but because it allows me to pay tribute in my own words to the worth of this Association and to remind you also of the benefits which membership in it carries to those of our profession.

I have chosen to do this rather than to address you on any scientific or technical ground because, in the program as arranged, this field will be most ably covered, and because I believe that a reminder as to our aim and object may not be amiss in these days succeeding the time of our trial on the bloody fields in France.

I am going to endeavor not to be so prolix as to weary you with words, and I ask you to make allowance for me if my own personality creeps into what I have to say. It is a matter which *does* concern me personally, and I cannot but feel that my own position is that of many others of you who are members of the Association and that my case finds its parallel many times in those of you who are present and among the many others whom circumstance has not allowed to join us here today.

We shall hear later, from Dr. Brown, of the beginnings of this association, of the recognized needs which gave it birth; and those of us who have been members for any length of time are cognizant of the growth of the society and the increasing importance of its work.

That is the point which I wish to emphasize—the fact that, far from being accomplished, the task of the Association of Military Surgeons is as much a live issue now, in 1920, as it was when its originators saw the necessity for it years ago and commenced the work which we now carry on. They have handed us the torch from failing hands; be ours to hold it high.

"Preparedness" is a topic about which we have heard and still hear much, and in its many phases it has both supporters and antagonists. Yet, if it come to the literal meaning of the word, there cannot well be any opinion save that of approval. If any situation is to arise which shall need action, either individual or national, there can be no

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question that those who have made provision for a contingency, however remote, are those who will be in the better state to cope with it when it comes. This is the basis on which our association was founded, and there are many members of it who can bear testimony that what they have learned through it has borne fruit, not only in the time of war just passed but in the stress of other crises. We cry loudly for the education of the public in many matters, and this age is one of instruction in many things. Where, then, are we to place an institution which shall be of advantage in fitting us to take up intelligently the burden which may fall on our shoulders as a result of the necessities of the state? This idea of instruction, of the teaching of the things which must be known by the civilian practitioner before he is fit for duty with the colors is the object which the originators of this society sought to attain. They strove to fit themselves for service at their country's need, and it is with this idea that the Association has gone on through the succeeding years.

As an evidence of the soundness of the idea there is no further testimony needed than the example of the Federal Government in the various measures which have made for the improvement of the organized militia: the establishment of the courses at Leavenworth with that end in view and the inauguration of the correspondence school for medical officers. All these have had as their object the making of better material from the uninstructed but willing personnel which, in the event of war, will be that on which the country must lean.

That, then, is the "why" of our Association—the recognition of the truth that in the event of a call to arms there must be many who will have to lay aside the duties of everyday life and subordinate everything to the common cause. And with all respect to our brothers of the regular services, it is on our shoulders that the heaviest share of this burden must fall, for we are many where they are few, and, although they shall be the leaven in the loaf, still that loaf in its majority is to be made up of you who are called from your offices and consulting rooms to don strange clothes and walk strange ways in the service of your country.

That being so, and there is no controverting it, is it not incumbent on each one of us to so fit himself that in the hour of need he shall be able to give the best that is in him?

I know that the average man will say: "Why all this fuss? We are done with war and there is little probability that I shall ever see any more." Is it ever safe to so predicate? What was the opinion in 1915 and even in 1916? Who then had any idea of the consummation that was to come on April 6, 1917? Every good citizen

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deplores the possibility of armed conflict, but all know that it is an ever-present possibility, and any logic must teach us that any step taken to shorten its duration is altogether in keeping with the civilization of this age.

I am afraid that many members of our Association regard their duty done because they are themselves members in good standing in it. Is that really so? Am I fulfilling my entire duty to the state if I leave any stone unturned which shall make available for it additional trained personnel in the time of need? Then, perhaps, although I have perfected myself in the things which I should know in order to carry out intelligently the duties devolving on a doctor under arms, I shall not have accomplished all that I might unless I make a reasonable effort to see that others do so as well. I do not mean by this that I advise you to be your brother's keeper, but I do mean to say that there are many of your brothers who have never had the matter presented to them and that they might profit from your experience and advice.

That is what I wish to impress on you—that we have in our Association the foundation for much good for the state and that it is through your efforts that this may be made available when it is needed. It is the tradition on which The Association of Military Surgeons was founded, and it is as much our duty now to carry it on as it was for those who first saw the necessity for such a banding together of the medical men of the United States. I know that these are the days of reaction; that we are all, to quote our British cousins, "fed up" with matters military and very desirous of going back to our own particular niches and forgetting all about it. However, if my premises, as stated in what I have already said, are true, that is just what we cannot do. Military life is not now a matter of paramount importance perhaps, but as a safeguard of the peace of the nation it must always be at least a matter of importance and, as such, a live issue with each one of us.

There you have the gist of what I wish to say to you. I am trying, as one who at least wishes to be a good citizen, to impress on you the needs of the state and one way in which we of the medical profession may help to meet them. We have a society of which we may be proud, and it is one which should grow each year in position, dignity and numbers. The object of its foundation is public service, and it seems to me that it should be the aim of each one of us to see to it that each year finds us with a larger quota, and representing, as such, a greater number of those who are ready in a crisis to answer when the call comes. I know how easy it is to resolve at these annual meetings

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that we will go home and do what we can toward strengthening the Association, and I know also, alas, how very easy it is to forget these resolves in the press of professional work. I am not asking any promises from anyone, but I do urge on you, as your president, that you take the matter seriously to heart and endeavor to coöperate in advancing the common cause.

As to the present status of the Association, I shall go into no details, since our secretary will give them in his report in better form than I could quote them, but I do wish to say that in spite of the fact that there has been the disinclination for anything connected with war to which I have referred, we have gone on and are on a sound basis and with prospects of advancement. That this should be so in a period of reconstruction is a cause for congratulation, but not one for any amazement when we take into consideration the fact that this Association is one of the best known in the country and numbers so many distinguished men on its rolls.

I hope that I have not wearied you in what I have had to say, and I am hopeful that you may receive it in the same earnest way that it is spoken and that my words may be productive of good results.

I do not feel that I can close without expressing, for the Association, our gratification and pleasure in the presence with us here of the representatives from our Allies. It is a graceful thing for them to have come, and I hope that, even as they aided us and comforted us on the stricken fields of France, so they will here and now lend us the assistance of their able counsel and advice.

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JOSEPH ARDA HALL, LIEUTENANT COLONEL, OHIO NATIONAL GUARD

Lieut. Col. Joseph A. Hall, who retired from the presidency of the Association on April 24, was born in New England, Ohio, on December 4, 1872. He was educated at the public schools of Chillicothe and Cincinnati, Ohio, and received his military training at the Ohio Military Institute and Ohio Wesleyan University. After the completion of his schooling he graduated from the Miami Medical College in Cincinnati on April 1, 1897. On December 4, 1892, he enlisted in K Company, Fourteenth Infantry, Ohio National Guard, and was discharged October 16, 1893, to accept a commission as First Lieutenant and Commissary Officer, Fourteenth Infantry, Ohio National Guard, from which office he resigned April 21, 1897. On May 25, 1898, he was appointed Acting Assistant Surgeon, and this contract was annulled December 31, 1900. He was commissioned Captain and Assistant Surgeon of the Ohio National Guard on November 3, 1903, and promoted to Major and Surgeon on June 28, 1906, and was commissioned Major, Medical Corps, Ohio National Guard, on September 25, 1908, with rank dating from June 28, 1906. During this time he was assigned to duty as Acting Surgeon General of Ohio, and was commissioned lieutenant colonel, Medical Corps, Ohio National Guard, on April 24, 1911.

On June 28, 1916, Colonel Hall was mustered into the United States service for border duty; on August 5, 1917, he was drafted and mustered into the Federal service and assigned to duty as division surgeon of the Thirty-seventh Infantry and served in this capacity in this country and overseas in France, being mustered out of the United States service on March 17, 1919. During his service in the National Guard he served a number of times in strike duty and was division chief surgeon during the floods of 1913. He served as aide-de-camp to Governors Myron T. Herrick, John M. Pattison, Andrew L. Harris, Judson Harmon, and as personal aide to Gov. James M. Cox. In 1911 he served with the division surgeon of the Provisional Division, at Fort Sam Houston, Tex., and in 1912 was a member of the Field Service School for Medical Officers at Fort Leavenworth, Kans.

From the above it will be seen that his association with the military side of his profession began in his early life and has been consistently carried through, and those who know him and his record can testify to his efficiency in the various duties in which he was employed.

During his career in civilian medicine he has been a member of the staff of the Cincinnati General Hospital; Associate Professor of

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Gynecology of the Ohio-Miami Medical College, Medical Department, University of Cincinnati. He was also medical member of the board for the construction of the Lima State Hospital. This work required six years, and the hospital is a most modern institution of 1,200 beds. At the time of being called into the service of the United States he was chief surgeon of the Cincinnati, Hamilton & Dayton Railway.

During his period of service as president of the Association of Military Surgeons the business of the Association has made smooth onward progress, and he retires leaving its affairs in good shape and with the prospect of further advancement. The last meeting over which he presided and which terminated his connection with the Association as one of its officers was one of the most successful in the history of the Association, and this was in no small measure due to his energy and competence as the presiding officer. His valedictory address carried the thought both of loyalty to the Association over which he presided and of loyalty to the country of which he is a citizen, and is well worth careful consideration from either angle by the members of the Association. We print this elsewhere in this issue.

Those who are fortunate in knowing Colonel Hall need no reminder of his efficiency in whatever he undertakes nor of his personal grace and charm for those whom he honors with his friendship.

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TYPHUS FEVER IN POLAND

By Colonel HARRY L. GILCHRIST[1]
Medical Corps, United States Army

(With three illustrations)

FROM present indications Poland is threatened with one of the worst typhus fever epidemics in the history of the world, which, unless checked, will prove a danger that will threaten the whole of Europe. The Government of Poland is fully alive to the duties incumbent upon her in view of the seriousness of this present epidemic, but cannot conceal the fact of her inability to cope with this grave situation which is developing for the reasons of her lack of financial resources and sufficient sanitary supplies in the present overwhelming emergency.

The typhus epidemic which for the fourth year in succession has been raging in Poland has increased in intensity each year due principally to large influx of refugees and prisoners of war from Russia and to the thousands of cases being imported from the interior of Ukrainia and other eastern territories. The situation at present is getting beyond control.

This western spread has become more and more extensive in a measure as the military and political conditions of Ukrainia have become more unsettled. In fact the breaking up of the armies of General Petlura resulted in tens of thousands of the Ukrainians percolating through the frontiers passing principally through the areas between Tarnopol in the north and Borszcow in the south. Sometimes they presented themselves at the quarentine stations in such crowds that they could not be handled, and a break through would result thereby permitting thousands of cases to be scattered throughout eastern Galicia.

It is a known fact that the commanders of the Bolshevik armies are ridding themselves of typhus fever cases by sending them in armoured trains to the Polish border. There they are unloaded and allowed to drift for themselves into Polish territory.

When Denikin's armies retreated before the Bolsheviks and the Polish armies invited to occupy the vacant territory, which they are still engaged in, a new and unbelievable large source of typhus fever was opened up. Certain of the larger towns such as Winnica were found to harbour thousands of cases without the least care or attention having been given them. As a rule Denikin's garrisons left behind were garrisons of typhus fever.

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[1] Commanding American Polish Typhus Relief Expedition, Warsaw, Poland, February, 25, 1920.

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The center of the present typhus epidemic appears to be in Russia and Ukrainia, and thousands of refugees entering Poland in their flight from Bolshevism are received in a frightful state. They relate terrible tales as to the number of cases of typhus fever and the suffering resulting therefrom. During the extreme cold these unfortunates inflicted with the disease and without medical attention of any kind, crowd together in unventilated, heatless buildings trying to keep warm. They die by the thousands, their bodies being piled in great heaps in adjoining buildings awaiting burial. Poland realizes these conditions in Russia and Ukrainia, and from a humanitarian standpoint makes no attempt to bar entrance to these refugees. She is thus a rampart against the dangers of this disease, which threatens the world, and which if Europe is allowed to be thoroughly saturated will result in perhaps one of the world's greatest catastrophies.

In Galicia conditions are bad, very bad, naturally so considering the unsettled state of this part of the country during the past five years. At the very onset of the war the Russian forces entered this part of the country from the east by way of Brody and Tarnopol, and from the south from Bukowinia by way of Nadworna, Lemberg or Lwow, being taken without resistance September 3, 1914. The Russians continued their advance westward almost to Crakow, occupying the whole of eastern and a large part of western Galicia until June 1915 when they gradually retreated before the advancing Germans. Lwow was evacuated in haste June 20 of that year, without being destroyed as were the majority of the smaller towns and villages which were systematically pillaged and burned. A determined stand was made at Zloczow, about sixty kilometers east of Lwow, for three months when they were forced to continue their retreat to the border. Subsequent to the revolution in 1917 that so demoralized the Russian Army, the Austro-German forces advanced into Russia occupying the fertile Ukrainian steppes as far as Kiew and Odessa and beyond. Until the signing of the armistice in November, 1918, foodstuffs were exported thence in great quantities into Austria and Germany, and thus Galicia did not suffer great want until the troops of the Central Allies were withdrawn. At that time the Ukrainian national movement which was accompanied by so many acts of violence and brigandage in southwestern Russia, was participated in by the large Ruthenian or Ukrainian population of Galicia, and for almost a month Lwow was the scene of the fiercest kind of intraurban warfare until the arrival of regular Polish troops restored law and order.

Paralleling the various political and economic changes the sanitary and especially the typhus, conditions, not at all alarming during the years of the war itself, seem to have become very serious following the armis-

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tice, due to the extensive infection introduced by the entirely undisciplined and very poorly equipped Ukrainian army. Indeed the maximum number of cases of exanthematic typhus in this portion of the Polish army which was reached in the spring of 1919, seems to be due to the large number of Ukrainian prisoners, and to the contact of the soldiers of the two forces.

In Galicia whole towns are crippled. Schools are closed and business practically suspended from the effects of the disease. In the northeast of Poland American inspectors report the disease raging as affecting nearly every home with a high mortality. Starvation and lack of clothing and medicines are also in evidence. There are few doctors and no nurses. As a result of the ravages of the past war and the fact that Poland has been occupied by several armies who, when retreating either destroyed or took with them all the materials of any value, the eastern country has been left with only absolutely meager essentials. Homes, which for the most part are rudely constructed affairs, and without furniture of any kind, offer shelter for thousands of these sufferers. They have no beds and lie on straw or hay strewn floors. The same materials answer the purpose of protecting them against the Polish winters. Many of these small huts consist of but a single room and here father, mother and several small children reside. The present article of diet in the majority of cases consists of potatoes, beets and other vegetables and these in only starvation quantities. They seldom see bread. Meat is furnished only occasionally.

At present nearly every house has from one to five cases of typhus fever all lying on the usual beds of straw or hay. Houses have been visited by me, in which the entire family were stricken, some delirious and without medical attention of any kind. Some cases were found in which the only nourishment consisted of raw potatoes or raw beets. The friendly natives are doing what they can to relieve this suffering, but due to the shortage of the essentials of living their aid is of little avail. Doctors and nurses are unknown to these people, the peasants acting as combined doctors, nurses and undertakers. If the dead have no near relatives to claim their effects the bodies are stripped before burial and their clothing taken away in ignorance by the peasants to distant parts, to be sold, thus implanting the disease in new areas.

There is a great dirth of doctors, in some districts there being but one doctor to each one hundred and fifty thousand inhabitants, the latter in many cases badly scattered. These doctors are doing a magnificent work but are greatly overworked and labor under terrible handicap of the lack of medicines and nourishment for the sick. The death rate among doctors has been very great; in Galicia alone over

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forty-six doctors have thus far succumbed. Included in this list is the name of Lieut. Colonel Register, Medical Corps, U. S. Army, who recently died in trying to help these people. Colonel Register was taken ill on December 18 and died January 2. A letter was received from him dated December 17, in which he made an invaluable report on conditions. He also took occasion in the same letter to recommend a young Polish doctor for faithful services and referred to him as a "live wire." Both Colonel Register and the "live wire" are now dead from the disease. Out of twelve doctors in Tarnopol hospitals ten have given up their lives for the cause. The mortality this year is very high being estimated all the way from 10 to 60 per cent. No one knows how many cases of typhus fever there are in Poland. The disease is here, there and everywhere. It is believed by the most conservative that the deaths from the disease will amount to hundreds of thousands. No reliable records are kept in the infected areas and outlying districts.

One fact is certain, the inhabitants of eastern and southeastern Poland are dying by the thousands. As stated before many cases are coming into Poland from the east. Quarantine stations are established along the eastern and southern borders and every attempt is being made to use them, but without food, fuel or clothing, little can be accomplished and thousands are permitted to enter the country without any attention having been given them other than registration and partial assistance in helping them along towards their homes.

The prisoners and refugees camps are in a very frightful state. Food, clothing and medicines are badly needed. Typhus fever, in all these camps, is greatly on the increase. There are practically no doctors nor nurses to attend these cases. The following extracts from a report of Maj. Willis P. Baker, Medical Corps, U. S. A., a member of this organization illustrates conditions found in a camp recently inspected. These conditions are quite general in other camps:

> There has been a great shortage from the first of all sanitary facilities. The hospital was built with a 200 men capacity. There are actually 843 bed cases now in the hospital and in improvised barracks, most of these cases are typhus fever, with also a scattering of tuberculosis, dysentery, relapsing fever and small pox.
>
> The first convoy in August, 1919, consisted of 200 men, of these 30 had typhus fever upon arrival at camp and in the next few days a total of 180 men or 90 per cent developed typhus. But in spite of this no epidemic occurred among the men of the barracks until December, 1919. Every convoy of prisoners arrived in about the same condition; all men were lousy and already infected.
>
> In December, 1919, all prisoners were exchanged with Ukrainia and this camp began receiving prisoners from a new part of the front; 400 came every day from a section of the front where there are 25,000 cases of typhus fever. Practically 80 to 90 per cent of the men were infected upon arrival. The resources of the camp were overtaxed and the disease broke out among the officers and all the workers. Of

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eight doctors, seven fell to typhus, leaving only one for the great mass of patients. There are six other officers on the grounds in charge, two of these are now ill with typhus. A large number of the permanent personnel became infected.

In the hospitals the patients are lying on the floors, or on simple board platform. There are no linens or washing of any kind. The bed sacks are made of paper and are very old and dirty. Straw is dirty, infected and lacking generally. Blankets are made of paper and the patients suffer terribly from the cold. There are no available medicines, instruments or hospital utensils of any kind. Washing and latrine facilities are almost absent and the whole place is foul and terrible. There are no towels or clothes of any kind in the hospital. There is a great shortage of eating utensils—only 800 simple pots to feed over 800 patients, so the feeding is done in turns, taking a great deal of time with no cleaning between times.

The patients are poor, foul and lie in their rags of clothing cuddled up under the one paper blanket and are in the most extreme misery. It is no wonder that tuberculosis is spreading among the patients.

It is interesting to know that of the 2,400,000 refugees and prisoners of war entering Poland during the past fourteen months, less than one half were Poles; the remainder representing 27 other countries, including natives from the United States. Notwithstanding this fact, Poland has, thus far, been obliged to stand the brunt of the work.

THE NUMBER OF REFUGEES ENTERING POLAND DURING PAST FOURTEEN MONTHS

During the past year there were approximately 2,400,000 refugees and prisoners of war who entered Poland. Of this number 1,206,089 were prisoners of war as follows:

Poles	374,124	Austrians	56,746
Russians	554,486	Ukrainians	42,165
Germans	19,503	Serbians	689
Lithuanians	14,407	Italians	1,783
French	4,078	English	70
Hungarians	44,286	Americans	8
Bulgarians	504	Ruthenians	43,365
Turks	611	Jugo-Slovaks	1,366
Belgians	17	Jews	4,349
Esthonians	409	Greeks	45
Lethonians	1,593	REFUGEES	
Chorvatians	426	Men	310,273
White Russians	13,780	Women	175,565
Chinese	90	Children	141,250
Tchecks	19,914		
Roumanians	5,165		627,088

Those who fled from the Bolsheviks to the Polish frontier and who did not pass through the quarantine stations or natural ports of entry, estimated at about 500,000.

Number of cases of typhus fever appearing among the refugees when entering the quarantine stations, 26,580. Of this number 1,560

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WAITING TO BE BATHED AND DELOUSED.

IN THIS SHACK AN ENTIRE FAMILY OF SIX ILL WITH TYPHUS.

(To face page 626.)

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EVERY OCCUPANT OF THESE SHACKS DOWN WITH TYPHUS.

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died soon after entering the station. The proportion of typhus fever cases appearing among the refugees during the past three months has been greatly increased. The following is an extract from the report of one of the medical officers with this expedition stationed at Dorohusk quarantine station: "Yesterday a train of refugees came in from the east. There were 118 refugees unloaded here, all were filthy and covered with vermin. Of this number I removed 15 well advanced cases of typhus fever to the hospital." Reports have been received from other stations giving the same proportion of cases.

WHAT POLAND IS DOING TO CHECK THE SPREAD OF TYPHUS FEVER

Poland has and is still spending millions of marks monthly for this work. It is believed that no country in the world has undertaken a similar problem on such a gigantic scale. She has purchased from the American Liquidation Board alone four million dollars worth of materials and besides this purchase she has also made extensive purchases from England and other countries. It might be of interest to state that the purchases made from the former organization required thirty-two trains, each of over 50 cars to transport the materials into Poland. Included in this equipment are the following important items: All the steam sterilizers which were in use by the American forces in France, twenty seven mobile steam laundries, 500 mules with harnesses, hundreds of carts, drags and etc., 10,000 beds, 40,000 sheets, blankets and pillow slips, 40,000 towels, 100 tons of soap, 17 motorized mobile bathing plants, 300 portable bathing plants, 4,000 Serbian barrels, 50 tons of washing soda, 1,000,000 suits of cotton underclothing, 160 three-ton Packard trucks, 320 Ford ambulances, 160 Ford touring cars, 5 mobile machine shops, together with hundreds of other items too numerous to mention.

The Polish Diet has fully realized the dangers connected with the situation and has voted unlimited credits to the Minister of Health to be used in combatting this eastern epidemic, further the Minister of Public Health has been empowered to appoint epidemic commissaries, or commissioners of health, whose duties are to coordinate and direct the work against infectious diseases of all agencies concerned, both military and civilian, these commissioners being endowed with summary judicial powers. Their word pertaining to the fighting of typhus fever in their districts is law. The plan of action of these commissaries is directed from the Central Committee attached to the Minister of Public Health.

This Committee at present consists of the following: Col. H. L. Gilchrist, Medical Corps, U. S. Army, Commanding the American

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Typhus Fever Expedition, and four doctors attached to the Ministry of Public Health.

For purposes of administration the Republic of Poland has been divided into nine districts, numbered consecutively from 1 to 9. Each of these districts is under the control of a health commissioner. Each district is divided into counties or sub-districts with a county or sub-district medical officer appointed by the Minister of Public Health.

In Congress, Poland weekly reports are received from every district thereby enabling the Ministry to keep a close check on the situation. Every effort is now being made to organize that part of Poland outside of the former division and when completed will practically place the entire country under the immediate supervision of the Minister of Public Health.

Departments of propaganda, transportation, statistics, hospitalization, quarantine, finance and schooling have been organized, each department being under the immediate charge of an officer of the Minister of Public Health.

The American Typhus Relief Expedition is working with and under the direction of the Minister of Public Health.

Heretofore there have been five different medical organizations operating in Poland and without coördination, each working independently, as a result much confusion was experienced. At present all medical organizations are operating under the direction of the Minister of Public Health in all matters pertaining to the fighting of typhus fever.

The plan of action decided upon by this combined body, in the fighting of typhus fever, is as follows:

(*a*) The organizations, equipment and maintenance of epidemic hospitals so as to ensure hospitalization and the removal of all typhus fever cases to hospitals.

(*b*) The establishment of experimental laboratories for research work.

(*c*) The establishment of a chain of quarantine stations, hospitals and housing barracks along the eastern front.

(*d*) The operation of epidemic field columns in connection with the hospitalization of cases.

(*e*) The furtherance of and establishment of public baths and bathing and washing places.

(*f*) The compulsion of all persons travelling to show certificates of cleanliness before being permitted to enter railway trains.

(*g*) The disinfectation of all railway passenger trains.

(*h*) The establishment of training schools for nurses.

(*i*) The encouragement of young college students to take up the study of medicine.

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POLAND NEEDS TO CARRY ON AN ACTIVE CAMPAIGN AGAINST TYPHUS

(1) Sanitary supplies such as soap in amounts measured by thousands of tons, hospital linen and underclothing by the hundreds of thousands of pairs, hospital equipment and etc., for thousands and thousands of beds.

(2) Food and fuel.

(3) Doctors and nurses.

THE AMERICAN TYPHUS FEVER EXPEDITION

This is the only relief expedition sent to Poland expressly for the purpose of working with typhus fever. It is strictly an army organization, its personnel being members of the Regular Army establishment and was ordered to Poland by the Secretary of War by direct orders of the President of the United States. The organization has been operating in Poland for the past seven months. Originally, there were 32 commissioned officers and 500 enlisted men in Poland, but this number has since been reduced.

The present personnel are quite familiar with the typhus situation and realize the importance of the work to be expected of them together with the accompanying dangers, nevertheless all have volunteered to remain and are working hard preparatory for an early spring campaign. All officers and enlisted men are familiar with the different phases of this work and customs. Some of the personnel are operating the large motor repair plant in Warsaw, which is believed to be the most complete of its kind in central Europe. Others are operating bathing and delousing railway plants; others installing plants for the disinfection of railways cars, which are great sources of typhus fever; other members of the personnel are on duty at the different quarantine stations and district headquarters, all are doing their best and working hard for the cause.

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A RATION FOR EMERGENCIES

By Lieutenant Colonel P. C. FIELD
Medical Corps, United States Army

THE War Department, from replies to the letter from the A. G. O., dated February 14, 1920, subject "Emergency Ration," has undoubtedly obtained a résumé of opinions, more or less hurriedly written, regarding changes in the reserve and emergency rations.

It is a difficult task to obtain an agreement between any two U. S. Army officers, that the present reserve ration is entirely satisfactory. It is equally difficult to obtain an agreement as to the necessary changes in the components of this ration. On the other hand, there is little or no opposition to the opinion that, for about eighteen years, all attempts to obtain a suitable emergency ration have failed. It becomes a question whether the idea of an emergency ration, as distinguished from a reserve ration, should not be finally abandoned and all efforts be centered in so changing the reserve ration, in components and method of transport, that the resulting ration may be not only in reserve but available and suitable for use as an emergency ration.

In controversial subjects, an unusual suggestion often results in active opposition, and in the expression of this opposition, valuable ideas may be obtained. It is with this hope that a few suggestions will be made.

The War Department asked the following questions:

1. Is the present reserve ration (par. 1205-3 A. R.) satisfactory?
2. If unsatisfactory, what changes are recommended?
3. Should an emergency ration be substituted for the reserve ration carried by the soldier?
4. If some form of an emergency ration is considered more desirable, state the general characteristics of the type so recommended.

It may be safely assumed that many officers finally decided to officially answer the first question in the affirmative, because of the disinclination to criticize when the latter might not be considered constructive criticism. If the first question is answered in the affirmative, questions 2, 3, and 4 become relatively unimportant, and a future American army will find itself, during prolonged combat, in the same unfortunate condition as did elements of the A. E. F., when their field ration supply failed. Such individuals or units had no emergency ration, the often issued 6-lb. can of beef had been too heavy to carry on the person and their condiment cans, containing the sugar and coffee, had been lost or had not been carried in the reduced packs used in combat.

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Having decided to answer question 1 in the negative, the second question must be answered. It has been well said that "a field ration must be compounded keeping in mind three aspects—the physiological, the psychological and the practical." The suggested changes will be stated and then viewed from the above mentioned aspects.

(*a*) Eliminate canned roast beef as a possible substitute for bacon. Many men detest it. They have to eat it cold, with its large fat content, under modern combat conditions of great fatigue, prolonged exposure and consequent lowered resistence, and under these conditions it is one of the causes of indigestion and diarrhea, with a greatly increased non-effective rate particularly in partly trained and unseasoned troops.

The bacon component of the reserve ration is popular and can be eaten for prolonged periods, if necessary, without disgust or symptoms of intestinal indigestion. The U. S. Army's experience with the bacon component of the reserve ration in front line combat operations is not great because the canned beef substitute has usually replaced the bacon. It has never been issued so that the individual soldier could carry his individual supply of bacon. It cannot be seriously considered as a dependable part of a real reserve ration until it is issued in a form easily carried by the individual soldier and quickly cooked. This means sliced bacon in containers. As a component of a reserve ration, it has the disadvantage that it must be cooked and is more difficult to obtain in sufficient quantity for large armies. If a substitute for bacon is necessary, it is suggested that many officers and men would prefer canned corn-beef hash to canned roast beef.

In considering the meat and coffee components of any ration, it must be remembered that in modern combat no fire, which gives a flare or any smoke, is allowed with front line troops and fires are prohibited behind combat lines to prevent discovery by the enemy.

(*b*) Eliminate the salt component. It is not needed in a reserve ration.

(*c*) Eliminate sugar, granulated, carried in the condiment can. It is wasteful in that form and the individual supply of this component of the reserve ration is often used by the men to augment the ample sugar allowance of an issued field ration; hence is wanting when a sudden failure of the field ration supply necessitates dependence upon the reserve ration alone.

Before the World War, sugar substitutes were condemned as dangerous, but in the absence of sugar were demanded by officers and men of the A. E. F. in France, rather than drink their coffee unsweetened. European nations used sugar substitutes during the war, and, to date,

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no warning has been given against this use because of any result of said use by millions during long periods. It is therefore suggested, if a modified reserve ration is to be retained and the emergency ration abolished, that a sugar substitute in pellet form be supplied in place of granulated sugar, and be carried in the compartment of the condiment can now occupied by salt. With this change, the sugar compartment of the condiment can becomes available for other uses.

(*d*) Add a cocoa preparation, unsweetened, to the above modified reserve ration, and carry it in the present sugar compartment of the condiment can.

This compartment will hold, by actual measurement, 120 grams (about ¼ lb.) of a commercial brand of prepared cocoa. In individual cooking, the cup of the canteen would be used for preparing and heating this cocoa. With the fluid level ½ inch. from the rim, this cup will hold 500 c.c. (1 pint) of fluid. Each man has a field spoon in his mess kit. One such spoonful, heaping as is the American custom, of ordinary commercial brands of cocoa, weighs 10 grams (about 3 drachms). One heaping kit spoonful of cocoa, plus a pellet of saccharin, makes a very acceptable hot drink of a kind which seems to be craved by the American soldier.

Above figures show that each soldier would have in his condiment can, for emergency use, sufficient cocoa to make 12 pints of a nutritious, stimulating and agreeable hot drink, in addition to the coffee component. This additional supply of a hot liquid food is believed to be a distinct advantage under combat conditions of prolonged nervous strain, shock of high explosives, great fatigue and prolonged exposure, particularly in cold, wet weather. It would lessen the use of unsterilized drinking water.

Association and service with the British divisions apparently did not overcome the average American's aversion to tea, although officers testify that their men gladly accepted the hot tea for the sake of having a hot drink.

The small loss of caloric value from the elimination of sugar would be more than offset by the addition of ¼ pound of cocoa. The use of chocolate, as such, is deemed inexpedient because chocolate, without the addition of milk, is not as palatable as cocoa preparations and is not as easily prepared for use under adverse conditions. Cocoa has the reputation of being chosen by civilians whose duty or pleasure calls for strenuous field work.

(*e*) Replace the coarsely ground coffee component by a powdered coffee preparation similar to the "Instant Coffee" commercial brands.

The average young soldier is apt to use too much of the coarsely

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ground coffee, in individual cooking, trying to obtain a strong decoction with little fire. The powdered preparation does not need any prolonged application of heat to extract the stimulating caffeine. As no alcoholic stimulant will ever be an issue to an American army, and some stimulant is desirable under combat conditions, coffee should be retained in all rations, but in a reserve or emergency ration should be in a pulverized form. If solidified alcohol is issued for use in emergencies, when ordinary fires are prohibited, the powdered form is necessary to save the alcohol.

(*f*) Add solidified alcohol as an emergency fuel.

The most common reason, against any change in the present reserve ration, is that given by those who claim that the canned beef substitute and the hard bread can be eaten "cold" when ordinary fires are prohibited or fuel is not available. This claim is very true, but our experience in France warrants the question whether the combination of "canned willie," hard bread and chlorine water is the best that we can do. This food and drink may prevent symptoms of starvation but it does not sustain morale. The necessity of having *hot* food, both for the well and the wounded, was never before so fully realized as in the late war. Heat alone is a great stimulant to the weary nervous system of overworked men and undoubtedly upholds morale. No morale, even that bred by national patriotism and propaganda, will continue well nourished with the indigestion of the above cold combination, even if it is declared entirely sanitary. Solidified alcohol volatilizes but does not liquify unless heated. Enjoying merely the odor ought not to constitute a breach of the prohibition amendment. No flare or smoke is produced by burning alcohol.

The physiological aspect of the above modified reserve ration is believed to be better than that of the present issue. In a recent article on this subject, it was shown "that 16 ounces of hard bread and 10 ounces of bacon gives the soldier 90 grams of protein with 3,600 calories per day with a total weight of only 1¾ pounds as compared to the garrison ration, weighing approximately 4½ pounds, and delivering 4,400 calories." The reserve ration allows 2 ounces more of bacon than the above calculation of values. This additional bacon, plus the ¼ pound of cocoa, would bring the caloric value of the proposed modified ration to about 4,000, after deducting the loss of about 300 calories, due to the elimination of granulated sugar. Bacon fat and the fatty ingredients of cocoa are certainly more digestible than the fat of beef as shown by their use in the feeding of children and convalescent adults. With digestion retarded by the prolonged emotion, great fatigue and nervous strain of combat, the more digestible fats are indicated, if we

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would lessen the diarrhea of unseasoned troops, which diarrhea cannot be entirely charged to the use of unsterilized water. The argument that cocoa is not needed with coffee, fails to recognize the fact that, in addition to being a stimulant, cocoa has double the food value of the sugar which it replaces. The salt component merely continues the average American's habit of using too much salt. The production of an artificially increased thirst results in excessive drinking of water, particularly during marches, with increased use of unsterilized supplies. The additional hot food and drink, made possible by the proposed fuel component, will be a great help to men when ordinary fires are impossible and the weather is cold.

The psychological aspect of the present reserve ration is believed to be improved by the proposed changes since it meets the criticisms of both officers and men who have served under the most varied conditions of field and combat conditions. The psychological state of a soldier may be defined as what a soldier thinks, and what affects his trend of thought.

In the individual, it is his mental attitude. In a new organization, it is a little less than mob psychology until training has proceeded far enough to cause a common trend of thought which latter was formerly called "esprit" but now is known as "morale." The mental processes of a young soldier and the things in his environment effecting these processes, are not the same as exist in the more mature officer or non-commissioned officer. Hence, forcing an army of young men to eat food which disgusts them, even if it sustains and nourishes them, lowers morale. Wars are not fought to a finish or armistice by well trained and disciplined soldiers, but by a citizens army of youths.

Average American youths are overfed and when placed on a restricted ration, demand food which is agreeable in appearance, smell and taste. Emergency rations, as issued in the past, have failed because they were repulsive to most men. Any successful ration must fill, to a reasonable degree, that aching void situated in front of the solar plexus, which bacon (or its substitute) plus hard bread, with the fluid of hot coffee or cocoa, will do. Heat is not only needed for the preparation of the meat, coffee and cocoa, but also to offset the nervous shock of modern combat and for the treatment of surgical shock in the severely wounded, awaiting transportation to field hospitals.

The practical aspect is of the utmost importance. Can this modified ration be carried on the person, and therefore be available for individuals or units, for short periods, when the field ration cannot be issued?

Conditions will arise in every war when rolling kitchens will be stalled, "marmite" cans not available and fires impossible. It is be-

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lieved that this modified ration is practical for individual use and transportation in bulk for issue. Bacon for emergency use should be issued sliced and canned.

The fuel component is the most difficult to make practical. Solidified alcohol was issued to some combat divisions of the A. E. F., in France and officers with these divisions report that it was of decided benefit and zealously conserved. Fuel necessitates dry matches. During the recent war, Americans discovered that matches could become scarce. Matches in the pocket are generously used and loaned. Wax matches in the other water-proof end of the condiment can would be more likely to be on hand when an unexpected emergency made the emergency ration the only available food. The reserve ration components must be issued in receptacles small enough to be carried in the reduced pack during combat and the future issue of a 6-lb. can of meat must be prohibited. Observation of certain units of the A. E. F. in combat showed that the present reserve ration, as issued and carried, was often used as an additional or surplus ration. If this ration is intended to be held in reserve and available in emergencies, its use must be strictly limited, and officers and men trained accordingly.

Question 3, when viewed from the practical aspect, must be answered in the affirmative, provided the new emergency ration provides real food and is not issued as a part of the field ration. Paragraph 4 of A. R. 1205 makes the reserve ration a part of the field ration, and when the field ration supply is interrupted, the reserve ration supply is also. On the other hand, the same question should be answered in the negative, if any of the old forms of emergency ration is to take its place.

For the reasons already given, question 4 may be answered in the affirmative. The suggestions offered for the modification of the present reserve ration are intended as an answer to this question.

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COMMENT ON REHABILITATION METHODS FROM THE NEUROLOGIC VIEWPOINT[1]

By R. SHEEHAN, M.S., M.D.[2]

IT is contemplated to have the U. S. Public Health Service assimilate the medical work necessary for the occupational determinations made by the Federal Vocational Board. The portion of this productive of the most difficulty is that which will be referred to the Neuropsychiatric Section, so it seems pertinent to take up the various factors to be considered, such as the difficulties likely to be met and the measures to be taken if these are to be successfully solved.

It is hoped that any criticism will be regarded as constructive; much already made, which has had to be contended with, has been otherwise, and too obviously ulterior in its motivation.

As the problem presented in the New York District is representative, it will serve as a basis upon which observations can be made. In each district, of course, there will be special factors requiring individual consideration. Here, for example, the large element of population which is of recent foreign extraction needs selective estimation, because of the well-known racial predispositions to the nervous disorders. In this respect we have been fortified in our previous conceptions of the psychology of the Hebrew, and impressed by characteristics of the Italians of which we were not entirely aware.[3] However, this opens too large a field for present discussion; the conclusions made in this regard certainly should be capable of verification elsewhere, and no doubt when assembled, capable of utilization in the industrial field.

On December 4, 1919, the District Medical Officer of the Federal Board in New York addressed a letter to the Supervisor, 2nd District, U. S. Public Health Service, following a recommendation from his own supervisor, in which he asked that a medical officer should be appointed to look after the men at the Seward Park Rehabilitation Center. He stated that this was a place where there were approximately 350 men in training, a number of them being borderline mental cases, as this school comprised to a large extent only the "misfits" and the "try-outs" whom the Vocational Board had had great difficulty in placing satisfactorily.

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[1] Read March 20, 1920, at a meeting in New York of the Medical examiners of the U. S. Public Health Service, for the 2nd District, which includes the states of New York, New Jersey and Connecticut.

[2] Lieutenant Commander, M. C., U. S. Navy; Psychiatrist, Third Naval District; Consulting Neuropsychiatrist, U. S. Public Health Service, New York.

[3] A. Myerson: "The Nervousness of the Jew." *Mental Hygiene*, Vol. iv, No. 1, January, 1920.

A. Sverski: "Mental Hygiene, An Urgent Need for Jewish Community of Greater New York." Author's Publication.

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The students there are taught from 9 a. m. to 1 p. m. at the Educational Alliance, 197 East Broadway, and from 3.30 to 6.30 p. m. at the Vocational School, corner 10th Street and Avenue B, where they are under educational supervision.

The problems at this school are of such a nature that it had soon become apparent, because of the frequent occurrence of mental handicap, that it would be necessary to have the advice of a physician, skilled in behavior reactions and occupational determinations, in order to make the proper dispositions.

It was the intention to utilize this center for trying out men at their former vocations. It was also requested that the medical officer assigned should report the progress of students under special observation, these reports to be made at least once a month. It was obvious that this would require a psychiatrist. Accordingly, Dr. Spencer C. Strauss, who had served under the writer in charge of the Psychiatric Unit, U. S. Naval Training Station, Pelham Bay, N. Y., a well-qualified neuropsychiatrist, with particular training along the lines indicated, especially in psychometry, was assigned to this school.

Observations were made, from a medico-psychologic angle, to determine whether the men coming to the school for training could be more or less accurately placed at their tasks, and whether methods could be applied whereby their mental capacities and developmental possibilities could be correlated sufficiently to assist us in our task.

One difficulty impairing the value of psychological placement in this instance was the fact that every man presenting himself had certain definite physical limitations, due to injuries. These narrowed his sphere of possible activity, so that, even if a satisfactory psychological and psychometrical determination of his vocational aptness were made, the results would always have to be secondary, in their importance to this handicap of physical disability, in the final selection of vocation, inasmuch as the physical element is fixed, while the mental coefficient is extremely variable and subject to considerable change under the influence of ordinary mental training, *i. e.*, educational measures.

This factor, the mental training, may produce considerable changes in this instance, because fully 90 per cent of the candidates were practically or totally illiterate.

This tended to render the routine forms of psychological examination very unsatisfactory. The usual mental tests were insufficient because of the candidates' illiteracy, and, in many instances, the lack of knowledge of the American language; these factors also made simple performance tests of little value. The best result obtainable was only approximate, which, of course, cannot be relied upon for accurate determinations.

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We must assume that men of a markedly defective mentality could not have gone through the Army, nor could many have passed the original observation of the army psychologists. It is presumable that all of these men went through training, and by far the greatest majority saw actual combat. It would seem that those of defective mentality would have fallen by the wayside, and, as a matter of fact, in the separate examination of about 100 individuals, only one intelligent defective was found, a moron. These examinations were not made by any routine method, but by what appeared to be the best means suited to the individual, of eliciting the information required.

The problem of appropriate shop placement was interesting. The shops include tailoring, drawing, sign painting, printing, carpentry, plumbing, machine work and electric wiring. These were visited regularly, and the work studied with the idea of discovering whether they varied enough in their respective psychological demands to make the establishment of appropriate examinations for admission a possibility.

As a result of these observations it does not seem possible to determine beforehand whether a man is better fitted psychologically for one shop or another. The chief difference in the demands are met, satisfactorily or not, by the individual who in each case departs from any general rule according to his particular wound disability. It is evident that they must be judged and estimated individually.

Further, the factor which most of all makes for success in occupation is the question as to whether or not it is congenial. It is readily apparent that there are no means available by which this can be determined for the individual. The most that can be done is to say whether he is better suited to one trade than another. The man must have the advantage of actual contact with the particular work before he can say in which field he will be most satisfied. For mental tests alone are absolutely unreliable, as accomplishment not only depends upon mental ability, but is subject to the influence of surroundings and by the emotions of hope and fear, success and disappointment, so that the occupational test itself is the only safe criterion to determine the path along which is to be obtained the most efficiency, and this must be the one along which the candidate shows the most capability and which will always be that allowing the greatest development of his individuality. Because of this, candidates should be given a trial, or as many trials as they choose within a time limit, then allowed to express their own choice. This seems to be the fairest way.

Of course, much time is wasted by the men shifting too frequently from one shop to another. This in a large measure is, in most instances, due to poor judgment and reflective of the illiteracy above noted. Many

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of the men by heredity for generations have been common laborers. They have little idea of what sheet metal work means, nor do they know the difference between sign painting and mechanical drawing. They must of necessity shift again and again before they find their place. Perhaps it would be better if they received three or four months of intensive common school training, with special emphasis laid upon trades and trade conditions and the various factors involved in skilled work before they are asked to choose their course. As it is now, the individual too often regards the final monetary return—that is, the wage paid by this or that trade—as the criterion of choice. It seems a mistake to insist upon a man being definitely at work in a shop at the end of thirty days. This ignores the fact that very often the man concerned is illiterate.

Further, it is wrong psychologically, as well as practically, for the student to realize that he can change his selection as often as he likes before he finally decides upon his work. Sixty days are allowed for this shifting process, but this carries with it the privilege of renewal. As a matter of fact many of the men have been in the shops for months without any approved recommendation for a particular trade training having been made. It would seem far better to give a longer period to solidly inform them of the various working conditions and allow only a narrow time limit for the choice; that is, reverse the present time distribution, making it sixty days for information and thirty days for choice.

Appreciation of the concrete from the beginning makes for rapid and real success in any work. The habit of starting at this and that, and leaving unfinished the things begun, caters to a positively vicious psychology. This is especially true when you are trying to convert those who have always been followers of crude labor into skilled artisans. The presence of such a try-out worker, with his lax attitude, certainly has a very deleterious effect upon those men in the shop who have already definitely selected a trade.

Another very important factor is that many of the men are not at all anxious to come to a decision, because as long as they are under the supervision and care of the board their pay continues, and this in the majority of instances is far better pay than they ever received before.

Observation indicates that most of the individuals, with whom we are concerned in particular, come from a group most of whom have had no regular occupation. They are those who, because of illiteracy, language difficulty, intelligence defect, constitutional inferiority, or psychopathy, predementia praecox, and in several instances frank psychosis, have failed in this respect. It is characteristic, and one might almost say pathognomonic, of these types, that a section of their

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careers shows that the sphere of occupation is fraught with the most trouble. Any psychiatrist knows that their histories reveal that they hold job after job for durations varying from a few hours to less than a year, all of which they lose because of their inadequacy and consequent inability to adjust themselves to the demands and circumstances of their environment.

All of these individuals who succeeded in getting into the service —many by their own effort, merely because of their desire for adventure and the irresistible impulse which seemingly prevents them from remaining fixed for any length of time and provokes their well-known peregrinations; others again being forced by the Selective Draft Act—are now, as a result of well-intentioned and beneficent legislation, brought under cognizance of the Federal Government. It must be realized that they will always have to be cared for at the expense of the tax-paying public, for in large measure their handicaps are inherent and unchangeable. Therefore it can be readily seen that we have to deal with a most difficult problem, one which the individual himself had never successfully handled and which heretofore has often resisted even well-thought-out educational and correctional methods. So that to improvise an adequate method of procedure to accomplish the purpose required should demand a personnel made up of well-qualified educators, and, of necessity, psychiatrists, assisted, perhaps, by psychologists, and further also those capable by experience of determining satisfactorily the demands of various occupations.

There must also be taken into consideration what is ordinarily looked upon as ambition, that is, the desire of the individual to take up a profession or occupation which appeals to him as being desirable, and this from several vantages, aside from the expected remuneration mentioned above. It is this factor which, so often through pride, influences parents of meager attainments, who by fortuitous circumstances have acquired means, to urge their sons to take up professions for which they are woefully inadequate. Occasionally they may apparently qualify, but they do so at such tremendous effort and achieve even moderate success with such difficulty that they cause themselves many discomforts, chagrin, and disappointments, and, if the stress is too great, even precipitate psychotic reactions.

Another fault which should be corrected, mainly because of its pernicious psychological effect upon the men in training, is the frequency of transfer from one rehabilitation center to another. Through this much time is lost. Six hundred men have entered this school since its opening in June, 1919, while today 300 are enrolled. Of the other 300, eight men are now employed in trades. The remainder,

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292, have been shifted about, moving here and there. A group of 100 were sent to the College of the City of New York to be taught the rudiments of engineering. The foolishness of this is readily apparent when we recall the large percentage of illiteracy found.

The teacher, through skilful observation of the progress made in the training and educational measures, should be able to determine quite accurately whether a man is making normal progress or not. The psychiatrist should be able to assist this determination by excluding those manifestly unfit and without potential,[4] also those who are proven inadequate by the available psychologic and psychometric measures. This should evolve the most practical method. Probably all candidates should be subjected to group tests. Through these a certain number might be eliminated. Also, when the instructor notices that a man is retarded and falls below the normal rate of progress to such a degree that he becomes an impediment, he could refer him to the psychiatrist for examination, who will find the reason for his retardation and be able to recommend the proper disposition.

Progress of an individual in any field of work does not depend alone upon his intellectual ability. His hereditary endowment and also his environment are concerned. This latter—where he lives, his food, his amusements, his associates—should be investigated, and, when at fault, adjusted. At present this side of the problem is markedly neglected. Often it will be among these faults that the reason for the psychiatric maladjustment will be found.

The consideration of the ordinary physical ills of the individual is important. Recently considerable effort has been made to care for these. It does not seem reasonable to expect these men, many of whom are crippled, to make a long journey from one of the schools to a hospital for treatment, a trip often difficult and at least time consuming. It is also objectionable for the same reason to require these men to go very far to have prescriptions filled. The effect of such traveling is surely deleterious. Frequently, because of these considerations, the men are negligent of themselves.

In this regard, it should be mentioned that at present there is no provision made for aiding the individual with the problems arising from illness in his home. Many of these men are married, and in many instances the man is compelled to act as nurse for a sick wife at the cost of lost instruction.

It is a fact that often 75 of the total 300 men are absent from the

[4] R. Sheehan: "Service Use of Intelligence Tests." U. S. Naval Medical Bulletin, 9, 194–200, April, 1915; "Exclusion of the Mentally Unfit from the Military Service." U. S. Naval Medical Bulletin, 10, 213–49, April, 1916.

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school at one time for one reason or another. There does not seem to be any fixed way in which such absences are investigated. Illness is nearly always given as the excuse.

It is clearly evident that the whole problem is one in which the medical factors involved are so important that it must be considered largely from the medical viewpoint, with the psychiatric element preponderant.

Case after case comes to our attention where the man has been recommended for vocational training. He applies to the Federal Vocational Board and is placed. Through some defects in method, consequent upon a lack of proper appreciation of the potential of the individual, he finds himself unable to cope with the demands made upon him. His only means of escape is to be sick. In our particular field, this means a recurrence of the psychoneurotic symptoms which are often engrafted upon a constitutional inadequacy. These are claimed to be the original cause of disability, through which the candidate became eligible for training. In other words, the individual must perpetuate his symptoms in order to insure his retaining the benefits of compensation. The repeated recurrence of these situations is quite prejudicial to any constructive measures of treatment. It really ends in the production of a neurosis similar to the well-known litigation neurosis, that is, one which exists as long as there is an object to be attained.

When a man fails, he is examined by a physician of the Federal Vocational Board, who, appreciating, say, the evidences of the neurosis, refers him back to the Public Health Service for treatment or convalescent care. This results in the establishment of a vicious circle which can be only detrimental to the individual and provoke criticism of the agencies concerned, both by the man himself and the many organizations interested in his welfare.

Examples could be quoted at length, but several are quite representative, and will suffice.

Case A.—Since discharge from the Army this man has been under medical supervision in his home town. He had sustained a wound of the arm, not at all serious, and which completely recovered. However, he complained of "shell shock," and the symptoms were described as "cardio vascular asthenia." Because he did not show any improvement he was hospitalized, through the District Office, at the U. S. Public Health Service Hospital at Cape May, N. J. Here he proved himself disagreeable, refractory, not amenable to discipline, and provocative of so much disturbance that he was discharged as undesirable. He again appeared at the office and was placed in St. Francis Hospital, the Bronx, N. Y., where he was successfully operated on for homorrhoids, which had antedated his entrance into the Army. He was then placed in the Pershing House, appearing regularly for consultation, as an out-patient. During this interim he applied to the Federal Voca-

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tional Board for training. He had always had a strong belief that he was destined to be a vocalist and desired to have training to prepare him for such a career. The Federal Board did not consider this desirable, which provoked a marked reaction in the individual, and he was referred back to us designated as suffering from an "endocrinopathic disorder," with the suggestion that he be given further convalescent care pending his assignment to training. Now he complains of some heart trouble, and stated that he had consulted private physicians who had subscribed to this opinion. The Medical Board here reported "Examination of heart shows no enlargement or organic lesions. The pulse is rapid, at rest being 96 to the minute. Lungs normal."

Careful consideration of this case in its entirety makes us conclude that this individual is now in what was his normal condition prior to his entrance into the Army. There is no reason why he should not return to what he states was his occupation, namely, gasoline engine work.

His make-up is quite typical of a class above noted.

The citation of this case suggests another factor that has had to be contended with in the handling of the men belonging to the Neuropsychiatric Section, and which has, because of their make-up, been productive of most difficulty. This has been the interest taken by the numerous auxiliary agencies, most of which were augmented or established during the stress of war with the object of assisting, in divers ways, the men in the military forces. Their personnel has consisted to a great extent of women, who have grasped this opportunity as a means of outlet, and in many instances this has been compensatory. In the men suffering from the psychoneuroses they have found a fertile field for their activities, for this type has quickly responded to the sympathy and humoring which many times is the expression of the derailment of normal instincts, particularly the maternal, and which, because of the mechanism of these disorders, has invalidated efforts at treatment, through preventing the aimed-at restoration of morale, essential in the rehabilitation of the psychoneurotic.

Case B.—Occupation prior to entering the service was a steam-fitter's helper, at which he was employed for about five years. He entered the service September 22, 1917, and was discharged on September 16, 1918. On February 3, 1919, he filed a claim for compensation and subsequently for vocational training. He was placed in an electrical course on April 29, 1919, at Detroit, Mich. Because his parents reside in New York City he requested transfer to this district. On February 9, 1920, the New York office of the Federal Vocational Board advised him to take a course of steam-fitting and plumbing. Upon reporting to the place assigned he was diverted to a class in sheet metal work because the one for steam-fitting was already full. He worked at this assignment three days and then gave it up because he did not like it. It was then suggested that he take up work as a furrier. However, he never commenced training in work because, after conversation with the officer in charge of this course, he was advised to see the physician of the Federal

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Board. This he did, and after examination he was referred to the Public Health Service with a letter recommending convalescent care until such time as he would be able to take up training.

In this instance we have an individual who is very representative of the class in which symptoms of neurogenic origin are provoked because of the difficulty of the situation in which they are placed. Here their efforts to acquire the benefits of training come into conflict with their inability to meet the requirements.

Case C.—This man had been assigned by the Federal Board to a course in truck farming in the State Agricultural School at Farmingdale, L. I. He stated that he had completed the theoretical course in this branch, and that "there is no chance to do truck farming with 3 feet of snow and ice on the ground, and they won't be ready for farming until April." It was ascertained that he had some difficulty with one or several women, which was productive of considerable emotional disturbance. He was referred by the Federal Board with a recommendation that he be granted convalescent care for two or three months.

Examination failed to reveal any evidence to warrant giving this man convalescent care. He was an ordinary colored man who was fully competent to pursue the course indicated by the Federal Board. He does not require convalescent care, but merely maintenance until he is able to pursue the work mapped out. This same problem has come up in many cases. However, taking care of the individual while the matter of his training is being decided or deferred should not be under the guise of treatment for some disorder from which he has recovered, or which is suggested. This method can be only productive of much damage through the resulting psychic traumata.

If the Public Health Service is to accomplish results by effectually handling the medical problems encountered by the Federal Vocational Board in their effort to rehabilitate men who have been in the service, we must, aside from the general medical considerations with which our section is not concerned, take up those which particularly come within our province, and which it is fair to estimate involve half of all the men under cognizance, and evolve a comprehensive approach. To accomplish this purpose it is recommended that—

1. All candidates be subjected to group tests.

2. Individuals selected through group tests, and those regarded by instructors as retarded, be subjected to intensive psychiatric examination; which should include a psychometric estimation, and careful consideration of all factors concerned in the individual's inability to meet the requirements of the training.

3. Opinion should be rendered which will enable a proper disposition to be made in each case, whether hospitalization, institutional care, ordinary educational measures, or that the individual is at what is his normality, and not amenable to or requiring vocational training.

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4. To accomplish the above recommendations a convenient place should be provided, equipped with the necessary apparatus to perform psychometry. This should be conducted by a properly qualified and well-selected psychiatrist, who should have the assistance of a psychologist with the requisite experience in making the necessary estimations, and, if the scope of the work warrants, such clerical help as is necessary. Further, the psychiatrist should have the aid of the present Psychiatric Social Service, which may have to be augmented for this purpose. He should refer, as necessary, special cases to the Medical Board in the office of the district supervisor, or avail himself of the consultant provided as seems indicated.

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THE INSIGNIFICANCE OF RECORDING CHEST MEASUREMENTS MADE AT THE NIPPLE LINE

By Colonel ROBERT M. CULLER
Medical Corps, United States Army

(With six illustrations)

THE SIGNIFICANCE of estimates of chest expansion made by the tapeline probably seldom arises in the minds of observers making physical examinations of students, applicants for life insurance, soldiers and sailors. Those who believe that circumferential chest measurements are of great value in physical surveys either have thought very little of the matter, or have accepted a chain of false premises upon which their opinions rest.

Attempts to modify views held through preconceptions, however erroneous, invariably excite antagonism. There are those who will violently defend false premises concerning every-day matters without taking the trouble to prove the truth to themselves. There are those, including medical men, who believe and cling to the idea that woolen underwear is advantageous, because it "absorbs the perspiration," yet these same persons cannot be induced to habitually use woolen towels to dry themselves after bathing, because they quickly find out that wool absorbs moisture but poorly and slowly. It is hoped that the points raised in this discussion may be admitted to the temporate consideration of those who decline to accept them as facts.

The practice of eliciting and recording the amount of chest expansion, at the nipple line by inches, is so common that both examiners and subjects believe this ceremony to be the basis on which opinions are formed as to the competency of the lungs, and where a respectable degree of expansion measured by the tape is elicited, both examiner and subject are satisfied and entries are made on a blank form which is interpreted to mean that the individual has respectable physical vigor and is suffering from no lung disease.

The size of the chest of a given individual depends upon the angle of attachment of the ribs to the vertical lines of the spine and sternum respectively. If there is acute angulation the chest is small; if the angulation approximates a right angle, the chest is at its maximum size. The various forms described in text-books as flat, barrel shape, pigeon breast and normal, depend not upon rib angulation but upon the curve made by the ribs as they pass from behind forwards. In the flat chest the ribs make a sharp curve between their terminal attachments; in the pigeon breast a lesser curve of the ribs gives a

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long anterior posterior diameter to the chest with a corresponding lesser lateral diameter; in the barrel chest the curve of the ribs is such that the two chest diameters are approximately the same. These, and other classical forms, are immaterial as far as lung capacity is concerned, all being compatible with great lung power and bodily vigor, provided they are large enough, the size depending, as before stated, upon the angulation of the ribs with respect to the vertical line of sternum and spine. An acute rib angulation means a small chest no matter what its form is, while angulation approximating a right angle means a chest of wide capacity irrespective of form classification.

In young and undeveloped individuals we usually observe a small chest due to acute costal angulation. As the young man grows and develops the auxiliary respiratory muscles, this acute rib angulation becomes less with a corresponding increase in diameter of the chest. The chest development which follows proper physical training then is largely due to the elevation or increase in rib angulation, the maximum being reached when the ribs are at right angles to the spine and sternum. This increase in the diameter of the chest is coincident with a proportionate increase in the size and function of the lungs themselves.

An underdeveloped man then may have a wider chest expansion than one who has attained a maximum degree of development. Paradoxical as this may seem at first glance, actual measurements taken into consideration with other developmental changes brought about by physical training, will convince the most skeptical that the tapeline index of chest expansion taken at the conventional level of the nipple line is of no great importance in physical examination and that the diameter of the chest at full inspiration merely represents the potentialities for development in the individual. The highest reading of the tape at the nipple line is an index only to the normal size of the chest when the ribs are held at or near right angles by muscular action.

As middle age approaches, the rib articulation participates in those changes tending toward lessened mobility of joints. If chest mobility were any real index to lung elasticity and competency in general, the lungs of men in middle life would be less potent in proportion to the lessened mobility.

While the first five ribs may be raised slightly by the outward pressure of the lungs during inflation, a greater influence in this direction is exerted by the auxiliary muscles of respiration, notably the pectoralis major and minor, the first of which by its normal tonus raises the sternum *en masse* while the latter exerts direct action on the third, fourth and fifth rib, respectively. If these muscles are

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highly developed, their action will elevate the ribs, down to and including the fifth, as far as they will go, therefore at the level of the fifth rib, we can look for little increase in size of the chest on full inspiration in the already well developed and muscular subject. See Fig. 1, which shows action of muscles concerned in elevation of ribs at and above the nipple line, also demonstrating the fact that the tape at the nipple line passes over the latissmus dorsi at its widest point.

The discussion so far has ignored the action of the diaphragm whose function is almost entirely respiratory. This muscle is such an important part of the scheme of respiratory movement that, with all other elements fixed and in abeyance it can and does carry indefinitely the whole burden of inflation and deflation of the lungs. In Fig. 2 observe all muscles of the chest wall and shoulder girdle contracted, thus immobilizing the ribs, yet full respiratory function is maintained while the man supports a heavy weight. When respiration is carried on solely by diaphragmatic excursion, there is no change in the diameter of the chest at any time during a respiratory act, hence no chest expansion in terms of inches can be recorded. It is plain, then, that the chest expansion estimated in the usual manner by the tapeline is made up of only the minor elements of respiration and does not include results of diaphragmatic action.

The conical shape of the lungs and the arrangement of their several lobes; the fixed apex and immovable base of the chest cavity as a whole, all indicate nature's expectations in the expansion possibilities of the lungs. A cross-section through the chest at the nipple line does not pass through lung tissue of large dimensions, and yet at this point we habitually measure by a tape the performance of organs whose greatest bulk lies below this plane and whose widest expansion excursion is at right angles to it.

The pyramidal shape of the chest cavity, with its base supported by a great undulant muscle, indicates that the normal respiratory movement must be expressed in a downward direction to a greater degree than laterally. Are we then permitted to believe that lateral expansion of the lungs plus the size of the superimposed muscle constitute a standard of lung capacity to be expressed in figures of the slightest value to anyone reading them from a blank form?

A young recruit may measure 27 inches at the nipple line on expiration and 30½ on inspiration, while an older well-developed man may measure 40 and 42 inches, respectively. Proportionately to the size of the men and actually, if one judges by figures alone, the first man has a higher lung index than the second man. This we know is not the case, since the older developed muscular man has

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the acute rib angle widened by elevation through muscular action. It is clear, then, that a standard based on linear measurement of the circumference of the chest at a fixed point is of little value when applied to men of all ages and at all degrees of development. Such a standard ignores the changes which take place in the size and mobility of the chest through physical training which affects the voluntary auxiliary muscles of respiration, at the same time it ignores the office of the diaphragm whose performance of function in no way alters the size of the chest at the nipple line at all.

Well-developed muscular men may feign to have a great expansion securing a high reading by contracting the pectoralis groups and the latissimus dorsi muscles as in Fig. 3. As a matter of fact, the man shown in this picture has less chest expansion in inches at the nipple line than the recruit shown in Fig. 4, yet no one is likely to be uncertain which man has the greater lung power.

Fig. 5 illustrates the elevation of the ribs by muscular action with obliteration of the acute angulation of the costae, at the same time the diaphragm is arched upward to expel all but residual air. The picture is taken at the end of expiration.

Fig. 6 shows the same man at the end of inspiration. Note that the chest diameter has not noticeably increased in size at the nipple line over Fig. 5, but the epigastrium is made prominent by the low excursion of the diaphragm.

Actual lung disease may not greatly modify the figures obtained by the common method of computing chest mobility at the level of the fifth rib. I have in mind a man suffering from active tuberculosis at the apeces whose tapeline readings were "normal." Another man, under my observation at this moment, measures 34 inches at expiration and 37 at inspiration at the level of the fifth rib, yet he is suffering from diaphragmatic pleurisy and has been tapped twice.

I recall a case of huge liver abscess complicated with a basal pleurisy whose measurements taken in the conventional way would fill the average man with pride and satisfaction—indeed, in this case the extreme mobility of the upper part of the chest was an *indication* of disease in the lower portion, the high reading of the lateral expansion being compensatory for the immobility of his diaphragm.

When a chest measurement is made with "tape well up under the arms," the line passes over the pectoral groups of muscles and the latissimus dorsi (see Fig. 1), therefore this reading is the sum of the actual size of the chest plus the bulk of the above-mentioned masses. Laying aside for the moment the question of mobility, in a poorly developed or emaciated individual we can obtain a reading on the

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tape more nearly representing the actual size of the chest than we can in a man whose shoulder girdle is muscular. Adding to this observation the fact that the pectoral muscles keep in extreme elevation the ribs down to and including the fifth in the muscular subject, we can expect little excursion outward on deep inspiration.

While the pulmometer may be the only means of truly determining the capacity and competency of the lungs, it is not always practicable to use such a complex instrument. A tapeline estimate, if it can be made to mean anything and not assume too much, is advantageous in physical examinations on account of its convenience and absolute availability. If the tapeline is passed around the chest at the level of the ensiform cartilage, it will fall below the great muscle masses of the upper part of the chest, below that part of the chest influenced by their action, below the largest part of the latissimus dorsi, and will be on a level with a plane passing through a bulky part of the lungs themselves. While measurements at the level of the ensiform will not constitute an absolute index to lung capacity and power, yet such measurements will exclude factors which make measurements at the conventional level of little value.

Circumferential measurements at any level, however, will never bring to light defects due to asymmetry. A good typeline reading recorded on a blank form will not show comparative immobility of one side of the chest with corresponding compensatory mobility of the opposite side. If taken at the level of the ensiform cartilage the degree of mobility will include part of the affects of diaphragmatic action, since inflation of the lungs at their basis is largely brought about by the downward movement of the dome of the diaphragm. This consideration alone reflects the advantage of recording chest mobility at the level of the ensiform rather than at the nipple line.

Conclusions.—1. Lung capacity and competency cannot be estimated by a tapeline nor actual lung disease excluded.

2. The degree of chest expansion or mobility, expressed in inches on reports of physical examinations, are of no value except to suggest developmental possibilities in the immature.

3. The form of the chest in young men is immaterial, since all forms can be increased in size by rib elevation through muscular development. None of the classical chest forms are incompatible with great lung power and physical vigor.

4. If chest mobility is to be recorded by inches, the measurements should be made at the level of the ensiform cartilage.

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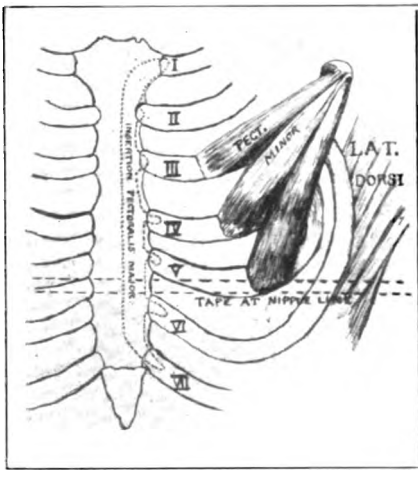

FIG. 1.

FIG. 2.

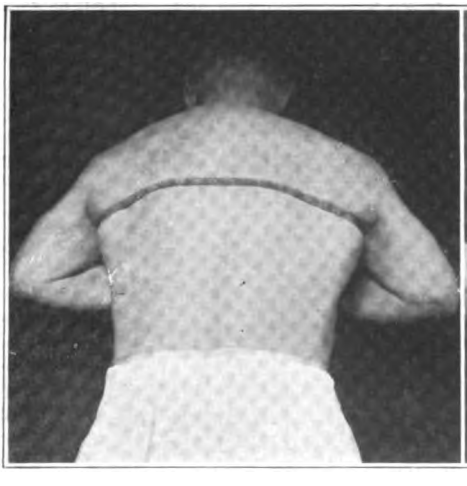

FIG 3

FIG. 4.

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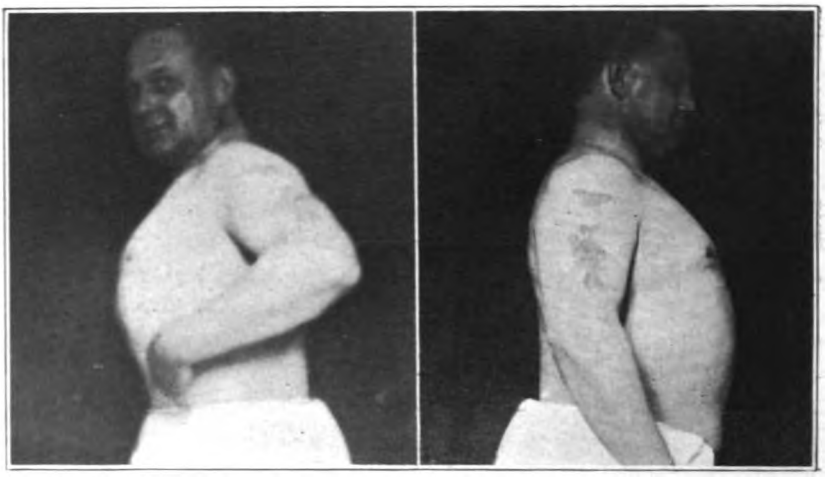

Fig. 5.

Fig. 6.

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THE RELATION OF DEFECTIVE MENTAL AND NERVOUS STATES TO MILITARY EFFICIENCY

The Wellcome Second Prize Essay, 1919

By Karl M. Bowman, A.B.M.P.

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THE importance of the relation of defective mental and nervous states to military efficiency could scarcely be exaggerated. Approximately 2 per cent of all the men examined for the draft were found to have nervous or mental diseases or defects. Out of 442,275 rejections for physical disability occurring in the draft, 24,514, or 5.54 per cent, were for "Mental Deficiency," and 23,728, or 5.36 per cent, were for nervous or mental disorder, or a total of 10.9 per cent of all rejections were due to defective mental and nervous states. The percentage of mental deficiency was 6½ cases for each 1,000 men examined; add to this that 18,620 were exempted as "morally unfit" and we find that a grand total of 66,862 were considered unfit for military service for intellectual, emotional, or moral defect or disease.

All this, however, takes no notice of the large number of cases occurring later during the war. After the battle of Chateau Thierry, 10 per cent of the American casualties were for mental or nervous conditions. Even after January 1, 1919, when our troops were being evacuated from France as rapidly as possible, and when all question of further fighting had passed, admissions to Base Hospital No. 214, the collecting and evacuating center for mental and nervous cases in the A. E. F., averaged about 800 a month.

I have been unable to get hold of any authentic figures of the incidence of mental and nervous diseases in other armies. We have, however, every reason to feel that the incidence was much greater than in our own. The figures commonly quoted by British neuropsychiatrists before the armistice were to the effect that between 40,000 and 50,000 cases of mental and nervous diseases had been discharged from the British Army. This, of course, does not count the thousands of cases which were not discharged from the army but which were continued in the service.

These figures are sufficient to show that we have a problem worthy of thorough investigation and study, and one which vitally concerns the military efficiency of our army. Mistakes in the treatment of this problem will be costly. A proper solution of it will result in a better and stronger army.

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To secure the best and strongest army possible, every available man must be used. Men should be used in the capacity for which they are best fitted, and men unfitted for military service should be eliminated at the earliest possible moment, preferably when examined for admission to the service. It is thus apparent that to secure the maximum efficiency we must eliminate all unsuitable cases of mental and nervous disease as quickly as possible and must use all suitable cases and use them in the positions for which they are best fitted. Our problem then becomes: (1) What types of nervous and mental states are totally unfit for military service? (2) What types are capable of full and efficient service? (3) What types are capable of limited service?

This problem having been solved, and the unfit mental cases having been eliminated, our next problem is to keep more cases from occurring. Although the examinations made by neuropsychiatrists disclosed a total number of nervous and mental cases of over 72,000, only 88 per cent of these cases were recommended for discharge, which means that, in the opinion of the examiners, 12 per cent of these cases were capable of doing military service. It is thus evident that our army will, and must always, contain a considerable number of both actual and potential psychopathics, neurotics and defectives. We are concerned, then, in what can be done to keep these individuals at their highest level and to prevent their breakdown; we are also concerned in the proper method of treatment in case of mental or nervous breakdown occurring in the service; and, finally, we are concerned in what prophylactic measures can be taken to prevent the occurrence of such a high percentage of persons unfit for military service.

It is a fact which is not always fully understood that the changes from civil to military life demand a great many new adjustments from the individual and alter his ways of living very materially. The average individual, on his entering the Army from civil life, discovers two things which are especially difficult for him to adjust to: first, the loss of his individuality; second, the surrender of his personal liberty. He is made to feel that he is merely a cog in the machine; he is made to feel that his own individuality is of but slight importance. He is compelled to give up rights and privileges which he has enjoyed all of his life, and which he has felt himself justly entitled to. While all this is a necessary part of his training, it must be recognized that it puts a great strain on an individual's powers of adjustment, especially if his habits have been to the contrary of those demanded by military life. Furthermore, there are always a number of apparent meaningless rules and petty trifles which the newcomer often finds upsetting and which he often rears against. Quite frequently he is among entire strangers, and he may be quite un-

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accustomed to being away from home. But no sooner has he commenced to adjust to these demands when still more are added—various responsibilities are thrust upon him. He is often compelled to undergo certain hardships which he has been quite unaccustomed to, and, finally, he may be subjected to the dangers of death or permanent disability.

Mental disease is a failure or a difficulty of an individual to adapt himself to his environment. As we have seen, on entering the Army, an individual must make a large number of new adaptations. These new adaptations are, from their very nature, difficult ones for the mentally defective, the neurotic, or the psychotic individual to make. It is therefore quite obvious that the vast majority of nervous or mental cases fail completely when all these new adjustments are thrown on them. It will be found, however, that there are a few individuals who will welcome relief from old adjustments and old failures and a chance to start in new. It will be seen, thus, that while the vast majority of mental and nervous states will be unfitted for military service, we will find a few benefited by it and we must try, if possible, to use every such case.

Concerning the demands of military life, we find that different branches of the service make different demands on the individual. We find that individuals are able to adapt themselves to one branch of the service where they may be entirely unable to adjust to the demands of some other branch. Many psychoneurotics and constitutional inferiors have made good stretcher-bearers or hospital orderlies, where they may be made to feel they are not taking life but helping to restore it. Many erratic youngsters made good aviators when they could not adapt themselves to ordinary discipline. Many morons made good in labor battalions but would have been rank failures in combatant service.

While the Army is made up of such branches as Artillery, Cavalry, Infantry, Signal Corps, Quartermaster Corps, Engineers, Medical Corps, and Air Service, for our purpose we can divide it into three parts; combatant service, non-combatant service, and technical branches. The technical branches may be either combatant or non-combatant service. We find that the demands for combatant service are a healthy body, an ability to stand hardships and discipline, and most of those qualities which are commonly considered as soldierly. The demands of non-combatant service are less exacting—the hardships and strain in severe warfare are infinitely less. In some parts, the adaptation is but little more than required of ordinary civil life. The technically trained branches require as their first requisite a knowledge, or ability

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of acquiring knowledge, of that special branch to which they belong; thus the Medical Corps must know of medicine, the Engineering Corps of engineering, the Aviation Corps of aviation, and so forth. After this technical knowledge they will then fit into the combatant or non-combatant service.

We may next pass on to a study of various mental and nervous states with which we are concerned. By "defective mental and nervous states" is meant any defect of the intellectual or emotional spheres, whether congenital or acquired. The most important of these are:

1. Mental deficiency, including all forms of feeble-mindedness.
2. Psychoses.
3. Psychoneuroses.
4. Organic nervous conditions.
5. Constitutional psychopathic inferiority.
6. Question of malingerers and conscientious objectors.

Mental deficiency is one of the most important conditions to be considered. It is widely prevalent. The very conservative estimates place mental deficiency as being 4 per 1,000 of population. The army examinations showed a higher figure; 6½ men per 1,000 were found to be defective mentally, *i. e.*, 24,514, or 5.54/100 per cent of all rejections. Thus more than one out of every twenty rejections was for mental deficiency.

Mental deficiency may be described as a lack of intellectual power, which is usually, but not always, congenital. The condition varies in degree from that of extreme idiocy to that of almost normal, and the gradations are so slight that it really grades insensibly into the normal. It is quite obvious in what way mental deficiency unfits for military service. The mental defective cannot understand or carry out properly anything but the simplest orders. He is very easily confused, lacks initiative, is easily frightened, and may cause or spread a panic; he will be of no value in sentry duty, in fact, he will be a direct menace to his organization rather than a potential benefit. It will be found, however, that some of the higher grade defectives can be used in the service. The labor battalions can use a considerable number. The combatant troops may have a very few among their number.

While all cases of mental deficiency should be carefully graded to determine the extent of their defect, it must not be supposed that the question of the individual's acceptance or rejection will depend solely upon his mental age. The problem is a little more complicated than simply doing a Binet test. The points to be considered in determining whether the mental defect is fitted for service are his mental age, his physical age, his physique, his willingness to work, and whether he is

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of a social or asocial type. It is clearly evident that a strong, healthy, obedient defective will be of more value to the service than one of slightly better mentality who is less strong physically and of the asocial type.

The best plan for determining the presence of defectives is undoubtedly the method devised by the Division of Psychology of the Medical Department for all recruits during the two-week retention period. These tests were applied, up to November 1, 1918, to approximately 1,500,000 men. As far as I can learn, these tests have not been published, but they consisted of three systems of tests; the first known as Alpha, which is a group test for men who read and write English, and which gives a wholly objective rating; the second is known as Beta, and is a group test for foreigners and illiterates—like Alpha, it measures general intelligence; the third is the use of individual tests such as the Yerkes Bridges, and the Stanford-Binet, and the performance scales, As a result of these examinations, a man was classified as "a," very superior intelligence; "b," superior intelligence; "c+," high average intelligence; "c," average intelligence; "c—," low average intelligence; "d," inferior intelligence; "d—" and "e," very inferior intelligence. Classes "d—" and "e" were usually found below ten years in mental age and Class "d—" men were commonly considered sufficiently intelligent for regular service, whereas Class "e" men were considered only fit for special organizations or entire rejection from the service.

A number of interesting conclusions have been drawn from these tests. Men below "c—" were considered unfit to be accepted for officers' training schools, "unless they possessed exceptional power of leadership and ability to command." Men below "c—" were rarely found to be equal to complicated paper work. Certain branches of the service were felt to be entitled to more than the ordinary number of mentally superior men, *e. g.*, the Signal Corps, Machine-Gun Battalions, Field Artillery, and the Engineers—"these organizations ordinarily have about twice the usual proportion of "a" and "b" men, and very much less than the usual proportion of "d" and "d—" men." Another point emphasized is that unless a proper distribution of intelligence prevails among regiments, some companies will train much more slowly than others and thus retard the whole efficiency of the regiment. Thus the finding of too many low grade men in any particular company should serve as a warning to transfer a number of them. "D" and "d—" men are rarely suited for tasks which require special skill, resourcefulness, or sustaining alertness. It is also unsafe to expect "d" and "d—" or "e" men to understand and carry out written instructions properly.

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The next class of cases are the psychoses. The principal types of psychoses are:

1. Psychosis with organic disease of the nervous system.
2. Psychosis with somatic organic disease.
3. Alcoholic psychosis.
4. Manic depressive psychoses.
5. Involutional melancholia.
6. Dementia praecox.
7. Paranoia, and paranoid states.

Needless to say, every case of active psychosis is incapacitated from military service of any kind. The question of study under psychoses is whether cases which have improved or recovered should be allowed to perform military service and, if so, to what extent. It may be said that the majority of these cases are unfit for military service of any kind, yet the custom of classing all such cases as unfit should be guarded against. Certainly many Regular Army Officers, who broke down with psychoses in the extreme hardships of the recent war, will become quite fit for full duty in a short time.

Illustrations

The case of Lieut. Colonel Z., second illustration given under Manic Depressive Psychoses, is an illustration of countless similar cases which occurred in the A. E. F., and which will become fit for full duty after they have completely recovered. It is a well-recognized fact that the psychoses of war are more benign than those of civil life and that a large number of cases diagnosed as, and presenting the symptoms of, dementia praecox while in the A. E. F., cleared up in a comparatively short time after reaching this country. Any picture of the different psychoses was so altered by the war that it became a common practice among the neuropsychiatrists to refuse to make a diagnosis of dementia praecox in the A. E. F.

The prognosis of all war psychoses is more favorable than that of civilian psychoses, and it will be found that the same rigid rules against military service, which should prevail against those having a previous psychosis in civilian life, should not hold toward those who have suffered a psychosis brought about from war conditions.

A few general rules may be laid down for study whether a case will be fit for military service. The points to be considered are: First, the age of the individual; second, his physical condition; third, the type of psychosis from which he has suffered; fourth, the number of attacks; fifth, the completeness of his recovery; sixth, his insight into his condition; seventh, his personality; eighth, does he really desire military

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service? All cases giving a history of a previous psychosis should be sent to hospital under the care of trained neuropsychiatrists, where a careful history and full examination can be secured and the patient kept under observation until a decision is arrived at. The type of psychosis will, also, materially determine whether the individual will be capable of military service. Certain types will practically preclude any possibility, whereas other types will allow one to estimate all the factors mentioned above in determining the question. It must be borne in mind, however, that this is an individual problem, and each case must be judged on its individual merits.

Under "Psychosis with organic disease of the nervous system" would be included traumatic, senile, arteriosclerotic, and syphilitic psychosis, general paresis, Huntington's chorea, brain tumors, multiple sclerosis, paralysis agitans, epilepsy, etc. Practically all such cases can be at once excluded. Certain traumatic psychoses, with a long period of recovery, might be accepted; benign brain tumors, with successful operation, might also be accepted.

Under "Psychosis with somatic disease" are included drug and metal poisons, pellagra, infectious diseases, post-infectious psychoses, exhaustive deliriums, cardio-renal disease, and disease of the ductless glands. A considerable number of cases of this class may be fit for duty. Those cases which have had but one attack and that a good many years previously, with good health in the meantime, will probably do well, yet one should always bear in mind that these individuals have possibly less resistance than the normal. Cardio-renal diseases will, of course, depend on the condition of the heart and kidneys. In regard to ductless gland disorders, it is quite obvious that we know too little about these conditions to dogmatize and, therefore, we should adopt a very conservative attitude toward them; by this I mean we should be conservative about accepting such cases for service. The present war has produced a great many exhaustion psychoses, and the problem of exhaustion psychoses is expressly interesting for that reason. The following case is given to show how such a case may do in the war:

K. M. B., admitted April 23, 1916, aged 28, single.

Family history.—Father alcoholic and does not support family. Mother said to have been placid, but lately shows deviated behavior, together with a 4-Wassermann and organic neurological signs.

Personal history.—Early life uneventful. Healthy, bright, played freely with other children. Always stammered slightly. Graduated from college at 21, with honors. Then took two years' engineering course. Then worked for construction companies. Did fairly well. In July, 1915, took an important position in charge of construction work. Patient worked excessively and had heavy responsibility. Gradually broke down with insomnia, inability to concentrate, headache, loss of

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weight. January to April, 1916, he spent in several sanitariums and was then admitted to Bloomingdale. On admission he was quiet, depressed, had ideas of reference, admitted having had auditory hallucinations. Had fair insight. Physical showed low blood pressure (105/57), left biceps, triceps, and knee jerks exaggerated, Hutchinson teeth. Blood and spinal fluid negative.

Patient continued about the same for two months, then made a suicidal attempt, became rather confused and delirious. Then continued depressed and apathetic until February, 1917, when he suddenly cleared up in a few hours and showed a relatively normal behavior He was discharged April 26, 1917. Diagnosis: Toxic exhaustive psychosis.

On leaving the hospital, the patient enlisted in the Canadian Army. He, after several months, secured a commission in the Flying Corps of the American Army and after a period of training went to France. He went through further training in France and stayed up under things quite well.

On studying this case, we find that this individual was 28 years old, *i. e.*, he was sufficiently young to stand hardship. He was of good physique, having been a college athlete. He had had only one attack, with a fairly good recovery, and had quite good insight into his condition. He had a very reliable personality. He was anxious to do military service. It will be seen, then, that nearly all the factors, which we have indicated should be taken into consideration, were favorable in this case and his success in adapting himself to army life might be reasonably expected.

In alcoholic psychosis, it may be said that acute conditions, such as acute hallucinosis, delirium tremens, and pathological intoxication are no special bar to military service. If the individual has a defective personality on top of it, that must be taken into account, but acute alcoholism in itself should seldom constitute cause for rejection. The chronic alcoholic conditions, however, should be viewed quite differently. Any chronic paranoid state, Korsakow, or well-recognized deterioration should prohibit military service. Still, one should frankly recognize that a number of chronic alcoholics, with a mild degree of deterioration, made good soldiers.

In manic depressive psychoses, we may say that the majority of such cases should be considered unfit for military service. Yet a number of such individuals can be used in technical and non-combatant service. Here again, we must realize that it is the individual, and not the disease, that will decide us in the matter.

S. M., 31 years old, married.

Family history.—Essentially negative. Members are intelligent and slightly neurotic.

Personal history.—Normal childhood. Healthy. Bright. Graduated from Annapolis. Remained in Navy. Was capable and efficient. Following assignment to work which he considered very distasteful and some temporary marital troubles, he developed a severe attack of depression and attempted suicide. His

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depression cleared up in a few months and he secured some insight. The marital troubles were satisfactorily adjusted and he was not returned to the distasteful work. He served at sea throughout the war and rendered efficient service.

Here we have a case of an individual of good stock, young, with a good normal make-up, capable and efficient, who developed a depression following some real difficulties of adjustment, and who gained considerable insight into his condition. Such a case would, of course, be of the most favorable type for service, and the good record made by this patient is not unexpected.

Lieut. Colonel Z., aged 41 years, married.

Family history.—Paternal stock is rather brilliant, inclined to over-activity, with considerabe alcoholism. Maternal grandfather delicate and neurotic. One uncle is irresponsible. Two aunts present a manic depressive make-up.

Personal history.—Normal childhood. Healthy, strong, always rather quiet, a good deal of a plodder, graduated from West Point at 24. Had rather an uneventful army life. Kept steadily at his work. Had dengue fever in the Philippines. Married in 1907. About 1908 had amebic dysentery. He is said to have been subject to "blue spells" and any criticism by his commanding officer would cause such a spell. He was always regarded as stubborn. Yet, on the whole, he had a frank, blunt, open makeup. He went to France in May, 1918. Was in all the principal engagements and carried on exceptionally well. Was cited several times and has been awarded the D. S. C., Congressional Medal, and Croix de Guerre. On November 3, 1918, he was admitted to hospital. Was depressed, exhausted, sleepless, self-accusatory, inclined to misinterpret. Made several attempts at suicide. Evacuated to the United States and admitted to Bloomingdale Hospital in February, 1919, where he remained until October 9, 1919. His course was that of a rather typical manic depressive—depression with some features of an exhaustion. He had practically recovered when discharged.

This case illustrates a depression occurring from an actual war strain and in an individual whose efficiency and makeup would lead us to expect him to be capable of resuming his duties in the Army.

Involutional melancholia can be considered much the same as manic depressive psychosis, except that the individual is a good deal older and the prognosis is less favorable. We should be even more conservative about allowing these individuals to serve than manic depressives.

Practically all cases of dementia praecox, paranoia, and paranoid states can ordinarily be considered unfit for military service and discharged as soon as diagnosed. A few cases of the simple type of dementia praecox, with a good arrest might do in labor battalions, but aside from this it is not felt that any cases can be profitable to the army.

Illustrations

G. M., 34 years old, married.

Family history.—One maternal aunt had a manic attack at 32. Brother is alcoholic and worthless.

Personal history. Normal childhood. Healthy, capable, bright. Graduated from West Point. Continued in army. Married. Led usual army life.

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In May, 1915, developed delusions of persecution. Said German spies followed him and shot him. Did many symbolic acts, practiced self-mutilation. Was in various hospitals. Finally, admitted to Bloomingdale Hospital in April, 1916. Under careful treatment and considerable analysis, he returned to a sufficiently normal condition to leave, and to any but an experienced psychiatrist would have appeared perfectly normal. After the war broke out he succeeded in getting reinstated in the army but soon broke down and was placed in the neuropsychiatric wards.

This case illustrates how a paranoid condition, even when fairly well arrested, tends to recur and unfit the individual for military service. It might be thought that this individual's years of life in the Army would make him more capable of adjusting to army life than to civilian life, but such was not the case.

F. T. L., aged 22, single.

Family history.—Slightly incomplete for three generations. Paternal line very intelligent and efficient. Mother nervous and high strung, and at present is in a sanitarium for involutional condition.

Personal history.—Was strong and healthy as a child. Did well in public school. Entered college at 18. Completed the course in three years. During his second year in college became restless and wished to leave. A strong masturbation complex was uncovered. He then went on all right. During his third year, while wrestling, he was thrown and suffered a sub-luxation of one of the cervical vertebra, with partial paralysis of both arms. Recovered in six weeks and finished out his college year.

After finishing college he went to work in his uncle's machine shops. Did excellent work, but soon tired of the job. He drifted from one job to another, often got into controversies with his father and was difficult to manage. Developed ideas of self-reference. Felt attempts were being made to injure him. Was sent to Bloomingdale Hospital.

On admission he was clouded and confused, disoriented, hallucinated. Physical examination was negative. This condition cleared up in a few days, and he then showed an essentially hypomanic behavior. This condition cleared up in about a month and he seemed superficially quite normal, yet, underneath, he cloaked a strong feeling of resentment and a firm belief that attempts had and were being made to take his life. He remained in the hospital until March 20, 1917, when he ran away from his uncle, with whom he was walking. He never showed any evidence of deterioration, and to anyone meeting him casually he would appear perfectly normal.

He joined the army shortly after this, but broke down within a few months and was sent to hospital for his mental condition.

Here we have an individual of high intelligence, with, in many ways, a high degree of capability, with as good a chance to adjust as could be expected for any case of this type, yet he broke down as soon as he got into active service.

These two cases are typical of the reaction of all cases of their type and show the necessity of rejecting similar cases.

The psychoneuroses form the next group for consideration. Con-

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cerning this group there will probably be greater difference of opinion than concerning any other. Psychoneuroses are such common and prevalent conditions, and yet so little understood, that a great diversity of opinion has arisen concerning them and, as would be expected, this diversity of opinion has spread to the question of the psychoneurotic in relation to military efficiency.

During the present war, an extremely large number of cases of psychoneuroses were treated in hospital and a great deal has been written concerning this subject. The psychoneuroses arising in war have been commonly designated as "War Neuroses" or "shell shock." This latter title has appealed not only to the lay-mind but to even a considerable number of psychiatrists, and the unfortunate use of this term has served to cloud the issue to quite an extent. If there is one fact clearly proven concerning the "War Neuroses," it is that they present practically no new features, that the physical effect of high explosives has had practically nothing to do with the causation of the condition, except in the production of emotional states. The myth of "shell shock" can be so easily disposed of that it is perhaps worth our while to devote a few words to it.

Practically all cases of so-called "shell shock" are among unwounded men, yet it is clearly inconceivable how the thousands of men actually wounded by the bursting of high explosive should fail to show the symptoms of so-called "shell shock." Since we have so many men wounded by shell explosions, with no mental symptoms, clearly a shell explosion is not the real cause of the so-called "shell shock."

One of the important problems to consider is whether the cases of war neuroses occurred among individuals already psychoneurotics, or at least strongly disposed toward a psychoneurosis, or whether they occurred among normal individuals. There is a good deal of difference of opinion concerning this point, but my own experience, gained from six months of study in a British hospital for war neuroses, and six months in the A. E. F., led me to believe that the vast majority of cases which got back as far as a base hospital occurred among predisposed individuals. Undoubtedly, a considerable number did occur among normal individuals, but these usually respond readily to treatment and are not a difficult problem to deal with. Certainly one finds that those cases most resistant to treatment are cases which give a positive history of some mental or nervous trouble. During the six months I spent in a British hospital, I studied very intensively a number of cases which had been in hospital for a period of from six months to three years, and in nearly every case it was clear, upon study, that the individual was markedly neurotic previous to being in the army.

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In cases which were of recent origin and which responded at once to treatment, I usually found very little evidence of a positive history.

Illustration

A. L., aged 29, single.

Family history.—Negative.

Personal history.—No evidence of neurotic traits. Passed a normal childhood; played freely with other boys. Was of average intelligence. Always strong and healthy. Went to France in August, 1914, as one of the "Contemptibles"; did first-line duty from that time until September, 1918. He was in the front-line trenches a considerable portion of this time, even under heavy fire and in a number of severe battles. In September, 1918, he was blown up by a shell. He suffered from severe headache, slight dizziness, tremors, and a great deal of mental confusion. He conceived the idea that he was losing his mind and that he would become hopelessly insane. He was promptly evacuated to England and came under my care at Magull Red Cross Hospital within two weeks after the onset. In the first interview his condition was explained to him quite frankly, and he was reassured of any danger of serious mental disease. When seen two days later, he stated that he felt quite all right and was willing to return to duty as soon as he should be considered fit.

This case illustrates the contention that cases of war neuroses did appear among perfectly normal individuals. Certainly, any individual who spent over four years in the front-line trenches in France before break-down cannot be classed as unstable or neurotic. Likewise, this case illustrates how readily the war neuroses respond to treatment if they do occur among individuals of a good makeup, without any psychoneurotic tendencies.

In the A. E. F., over 90 per cent of war neuroses were returned to duty, yet one must examine these figures carefully to realize what is meant. In the first place, all these troops were examined by neuropsychiatrists before being sent to France. Bearing in mind the statement made previously that the difficult cases encountered in the British Army were those which had a previous history of a neurotic condition, it would appear that the high figures in the A. E. F. are not so much due to the method of treatment as to the fact that the difficult types of cases had been, to a large extent, eliminated in the examinations made at the camps. Thus, our figures on the incidence and curability of war neuroses are quite misleading compared with those of other countries unless one keeps this point in mind. Again, our figures tend to show that reliance on mere statistics is not advisable, as due to the method of neuropsychiatric examinations used in our army, war neuroses were of less frequency and more easily cured.

It will then be seen that a fairly rigid elimination of psychoneurotics is of marked benefit to the service, yet we must bear in mind that psychoneurotics are frequently among our most intelligent and capable

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individuals in every branch of life. Among the highly trained professions, such as medicine, engineering, etc., there are found a great many psychoneurotics.

The problem of elimination can probably best be understood by a realization of what the defects of the psychoneurotic are. There are four principal classes of psychoneuroses: hysteria, psychasthenia, neurasthenia, and anxiety neuroses. The hysterical and neurasthenic types are much superior to the psychasthenic and anxiety types. The psychasthenic, from his peculiar indecision, phobias, and compulsive ideas, is never suitable for combatant service and should be rigidly scrutinized for even noncombatant service; similarly, the anxiety neuroses, which contain fear states, together with some compulsive behavior, unfit a man in the same way. Marked cases of hysteria and neurasthenia should be eliminated from the service, but mild cases are frequently very capable individuals and can be of great value in the non-combatant branches, and frequently, because of high intelligence and technical training, are suitable persons for the technical branches of the army. Yet, they are more predisposed to break-downs than the ordinary individual, and one must study them carefully to decide their capability. The remarks under psychoses, concerning how one determines whether an individual is fitted for service, can all be applied to the psychoneuroses.

A. G., 31 years old, married.

Family history.—Father died in an asylum. One sister is insane. Mother is neurotic.

Personal history.—Always nervous as a child. Easily upset and excited. Always had a number of morbid fears, one being a feeling that if he did not keep a strong grip on himself he would absolutely lose his self-control. He sustained a fractured skull when 19, and has suffered from headaches ever since. He was engaged in a small business when war broke out in 1914. Patient joined the British Army in February, 1916. He was sent to France in September, 1916, but had only been in France two weeks when he was sent to hospital suffering from "debility." In a few weeks he was out of hospital but was kept back of the lines until November, 1916, when he was again sent to the front. He broke down again and was sent to the hospital in December, 1916, again with a diagnosis of "debility." He was then returned to England. He was quite upset with air raids that occurred near the hospital where he was. After a year's stay in hospital, patient was again sent to France, in November, 1917. He was sent into the line in January, 1918, and broke down at Albert, March, 1918, and was again sent to hospital. This time he developed an aphonia which lasted for four months. This aphonia has recurred twice since.

This case illustrates the type of case absolutely unfit for army service and shows the consequences of using such an individual in the army. Although in the army nearly three years, he had spent over twenty months of that time in hospital and less than four months of that time had he been of the slightest service. The elimination of

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such cases is, then, one of the most valuable things that neuropsychiatry can contribute to the efficiency of the Army.

Our next group are the organic nervous conditions, consisting of such conditions as epilepsy, chorea, internal glandular disorders, etc. Every case of epilepsy should be discharged as soon as diagnosed. The reason for this is so obvious that it is scarcely worth repeating. Epileptics seldom, if ever, have a normal makeup, they are difficult persons to get along with, and even in the noncombatant branches their value is very questionable. Furthermore, they never adjust as well to army life as to civil life and had best be left in civil life. The other organic nervous diseases can be treated on the same basis as the psychoneuroses, into which they grade rather insensibly.

Under constitutional psychopathic inferiority, we have all those individuals who are, on a constitutional basis, unable to make the normal adaptation to life. The most important types we have to deal with are drug habitues, inadequate personalities, emotionally unstable, sex perverts, the pathological liars, and the criminals.

Cases of inadequate personality and emotional instability should all be discharged as soon as diagnosed; they are of no value to the service and will make much better adjustment at home than in the army.

The drug habitue, the sex pervert, the pathological liar, and the criminal are all individuals of no value to the community; worse, they are a harmful influence and an absolute detriment. When discovered, such individuals should not be discharged from the army and returned to civil life; these individuals are all trouble breeders and are dangerous persons to the community. They may easily be made use of by spies and agitators, and, in the unsettled and troubled conditions prevailing during war, it is best to have them away from the community. They are, of course, not fit for any branch of the service.

What, then, shall we do with them? The best possible use to make of these individuals, who are seldom self-supporting, is to have a semi-prison camp. They can then be used somewhat similarly to convict labor; on farm work, road building, or some kind of factory work, erected in the camp, might be preferable. This would cause a large number of indivuduals who had been, and would remain, a burden to the community to become self-supporting. The camp should be under proper psychiatric officers and there should be excellent hospital facilities. All drug habitues would be treated for their condition, and taken from the drug used, this would also be of benefit to the future as a certain number of these cases would be cured. During the late war a plan of this kind, for drug habitues, was contemplated at Fort McPherson, Georgia, by the Surgeon General's Office, but it was never carried through.

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Only one exception can perhaps be made, and this is the sex pervert among negro troops. The wide prevalence of sex perverts among negroes would make it seem that only in selected cases should such an individual be sent away from his organization to a semi-prison camp.

We have still left the problem of the conscientious objector and the malingerer. The conscientious objector is an old problem running through the ages. As far as history goes back we find individuals who, on religious or conscientious grounds, refuse to fight. No real satisfactory solution to the problem has been made, but a number of points of importance may be brought out. All members of a recognized sect whose teachings prohibit the taking of life under any conditions, should be exempted from combatant service, but should be required to serve in non-combatant branches, even if exposed to danger from the enemy. Such duty as stretcher-bearers, hospital orderlies, and work of that kind could well be done by these individuals. It is found that the well-recognized sects, like the Quakers, make little, if any, objection to this service, and it seems a satisfactory solution. Yet we do find that a number will refuse to do service of any kind. All these individuals should be subjected to a careful examination by neuropsychiatrists. A considerable number will be found to be cases of mental diseases. The following cases illustrate cases of this type.

Illustrations

H. H. P., 27 years old, single.

Family history.—Maternal stock rather neurotic. One uncle indolent; another alcoholic; one half-brother excessive in alcohol and sexually.

Personal history.—From childhood was "always nervous and easily excited; difficult to advise, emotional, high ideals, extremely conscientious." Always stammered and avoided strangers because of it. Eneuresis till 14. Afraid of the dark. Attended school regularly till junior year in college. Was very studious and usually at the head of his class. Masturbated considerably and had severe conflicts over endeavors to give up the habit.

In May, 1918, he was drafted against his wishes. He had been associated with a group of "conscientious objectors" for two months previous to this, and he made considerable objection to military service "on account of principle," stating that he hoped to establish a precedent for the release of other conscientious objectors. He was examined at camp and rejected with a diagnosis of "psychoneurosis." Following this, he returned home. Would have crying spells, and became depressed; tried a number of things from summer school to farm work, but was unable to carry on. Returned to college in September, 1918. Father died in October, 1918. Patient became worse, said he was insane, threatened suicide. Was taken to a sanitarium in December, 1918. Became very religious, read the Bible and talked on religious matters.

He was admitted to Bloomingdale Hospital May 3, 1919. He was restless, agitated, worried. Formal mental tests satisfactory. Physical examination negative except for tremor of fingers and enlarged thyroid. Under treatment patient improved steadily. He finally gained fair insight into his problems. He

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realized the real motive back of his attitude as a conscientious objector and once said: "I know now, just as well as the world, the whole thing that made me think of being a conscientious objector was that I was afraid to die." He reproached himself and his family. He said his maternal grandfather had paid another man $300 to take his place in the Civil War draft, and his father had left France to escape the Franco-Prussian War.

This case illustrates the true mechanism of the conscientious objector in many psychoneurotics and the need for regarding such cases as mental cases to be treated.

J. A., 32 years old, married.

Family history.—Essentially negative.

Personal history.—Nervous as a child. Cried easily. Often fainted. Very sensitive. Brooded a great deal. Belongs to the "Brethren," a sect much like the Quakers. He joined the Medical Corps to avoid combatant service.

Broke down gradually after fourteen months' service in France. Worried about his wife, who was a chronic invalid, and his inability to lead a satisfying spiritual life. "I would go back to France tomorrow if they would let me preach." "I think if I had found a meeting house for my own kind, I would have borne up." His breakdown came when he was told that all physically fit men in the Medical Corps were to be put in the Infantry.

This patient cleared up promptly on being promised discharge from the service as soon as he was well.

The mechanism in this case is considerably different from the one just previous, but illustrates the number of cases of mental disease found among the conscientious objectors.

These cases can best be treated by the neuropsychiatrists in hospital, and the classifying of a certain number of conscientious objectors as mental cases has a rather good effect in breeding a healthy contempt among other troops for this condition. If examination shows the individual to have sufficient responsibility, he should be treated as a criminal. The report of McPherson in the treatment of conscientious objectors of this type demonstrates the value of such treatment. A certain number of conscientious objectors are the result of lack of education or false education. A better standard of education throughout the country should rid us of this problem.

Malingering is a condition concerning which books have been written and which we can only touch on lightly here. It is a fact recognized by psychiatrists, but not apparently well recognized among other circles, that malingering is a very common condition among insane persons, and that even a confession of malingering obtained from an individual does not necessarily mean that the individual should be held responsible. As an example, when at Fort McPherson, Georgia, I saw a case brought to the neuropsychiatric ward from the guard-house because of "fits." After watching him in one such convulsion, it was obvious that he was shamming, and when accused he stopped in the middle of the convulsion and admitted it. Yet careful examination showed him to be a case of

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dementia praecox of the paranoid type, suffering from auditory hallucinations, and considerably deteriorated.

It is a fact emphasized by a large number of psychiatrists that the more carefully one studies cases of suspected malingering, the fewer he finds. One of the best and simplest ways of detecting a malingerer is complete isolation so that he has no one to talk to, nothing to read, and nothing to smoke. Very few individuals can stand such a regime for more than a few days and will then confess. Any proved cases of malingering must be rigidly and severely punished as a matter of example to others.

Having selected our army in the best possible manner to eliminate unsuitable cases of mental or nervous disease or defect, how can we prevent further cases from occurring? As we have seen before, 12 per cent of the cases of mental or nervous conditions found by our neuropsychiatrists in the draft were considered fit for active service. Furthermore, no matter how carefully an examination is made, a considerable number of actual and potential cases will be overlooked. Accordingly as we make a careful examination and elimination of unsuitable cases will we have a low rate occur later.

In such a picked army, it will be found that those cases occurring will be largely war neuroses and that the psychoses occurring will be principally manic depressive and exhaustion states. It has also been noted that psychoses of war are atypical and offer a much more favorable prognosis than similar cases occurring in civil life. The best general rule for treatment of mental and nervous cases during warfare is that all psychoses should be evacuated to the rear as soon as possible, and even after recovery should not be returned to the front for quite a prolonged period. The war neuroses, on the other hand, are best treated near the front. Following this method of treatment, 90 per cent of our cases were returned to duty. The hospitals for war neuroses should not be made too attractive, nor the life of the patient too easy. While the presence of women nurses in wards is desirable, the tendency towards coddling and sympathizing with the men must be carefully guarded against. The neurotic craves sympathy, and there is nothing worse than to give it to him. The understanding of the war neuroses by medical officers at dressing stations will avert a number of potential cases. The man who is blown up or buried, brought to the dressing station, can often be worked out of his acute emotional state at that time by proper handling, when, if left alone and evacuated to the rear, he will develop any one of the numerous symptoms of a neurosis.

The French Army adopted somewhat the following system of treating neuroses. The conversion hysterias were treated close to the front; painful electricity and such methods were used freely. The anxiety

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states, however, were evacuated to the rear, and treated with careful nursing attention to build up their condition generally. The anxiety states were not returned to the front in anything like large numbers.

The British Army tried various methods but never had any well-recognized system, and there was constant disagreement among different heads of the neuropsychiatric work in the British Army over the method of treatment, so that quite different methods were used at different hospitals.

In order to prevent the occurrence of mental or nervous break-downs among troops, there are certain things which are of value. In the first place, it should be understood, both by the troops and by the public in general, that while a break-down is not necessarily a blamable thing, it should never be looked upon in the light of something creditable. The experience of the British Army in awarding wound stripes for "shell shock" shows that anything which makes this condition more desirable attends to increase its prevalence. It should also be understood that a war neurosis which does not yield to treatment is never a creditable thing.

Bernard Hart, in his lectures on the war neuroses, said that the prevalence of "shell shock" in the present war was due to the fact that this was the first war that public opinion had ever expected it and allowed it. A proper education of the public in this respect should serve to prevent such a large number of cases from occurring.

Another point is that when the morale of troops is good, when they are winning, there are fewer cases of war neuroses. Thus, work which tends to keep up the morale of troops is of value from this standpoint.

As a preventive of defective nervous and mental states in the future, and their occurrence in our military forces, certain measures of a preventive or prophylactic nature may be advocated, which will be of value to the nation. First, the standard of education throughout the country should be raised so that every one capable of receiving it will be at least able to read and write and speak the English language. This will decrease the number of cases rejected on grounds of intelligence to a slight degree, and will facilitate in every way the work of the army. Second, a general campaign for mental hygiene throughout the country would be of value in decreasing the number of feeble-minded, insane and neurotic. Third, since 25 per cent of the cases of insanity in the United States are due to syphilis, a campaign directed at the prevention wherever possible, and the complete cure wherever acquired, will be of value. Fourth, the adoption of a system of universal military training will be of value because the individual will have been accustomed from childhood to the idea of performing military service, because the training will be given during peace times, and the adjustment required of the individual

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will be less, hence there will be fewer break-downs, and the result will be more people capable of service.

Summary

There are in the United States a large number of cases of mental or nervous disease or defect. This is shown by the fact that, out of every twenty men rejected in the draft, one man was rejected for mental defect and one man for mental or nervous disease. During the war every army had large numbers of cases of mental or nervous disease which markedly impaired the efficiency of the fighting forces. To secure the most efficient army possible, it is necessary to eliminate the mentally unfit as soon as possible, but to use available cases of mental or nervous disease or defect whenever possible and where best fitted.

To eliminate the mental defectives, the best way is to use the group examinations given by the psychologists to recruits. Such an estimate was perfected and used in our own army and is satisfactory. Border-line cases depending on their mental age, their physique, and disposition, may be fitted for service. The vast majority of cases with a history of a psychosis are unfit for military service. Those offering the best prognoses are: manic depressive, and infective exhaustive psychoses; acute alcoholic conditions, *per se*, are not a bar to service; chronic alcoholic conditions, if pronounced, or with paranoidal tendencies, are. Especially should it be guarded against allowing arrested cases of dementia praecox and paranoia from entering the service. Every case must be judged on its individual merits and by a trained board of psychiatrists.

Of the psychoneuroses, all extreme cases are unfit for service. Psychasthenia and anxiety neuroses are the worst types; hysteria and neurasthenia are the best. Because of the high intelligence of many psychoneurotics, they are valuable individuals, and should be used, preferably in non-combatant service.

The conscientious objector and the malingerer are frequently cases of mental disease, and, if so, should be treated as such; if not, they should be rigidly dealt with.

To prevent nervous and mental diseases from occurring, the method used by our army in France is to be commended— and the method of treatment used is as good as has been devised. The public should be educated towards a truer understanding of the war neuroses in an endeavor to prevent their occurrence. In the future our army will be benefited in mental health and efficiency if the general education in the country is raised and English is universally known—if a program of general mental hygiene for the country is adopted; if syphilis is prevented and properly treated; and if a system of universal military service is adopted.

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TRAINING OF THE ENLISTED MEN OF THE MEDICAL DEPARTMENT[1]

By Lieutenant Colonel GUSTAVUS M. BLECH
Medical Corps, Illinois National Guard

(One illustration)

THE training of the enlisted personnel of the Medical Department represents an important problem of the future, because experience has shown that, no matter how able medical officers themselves may be, they will accomplish next to nothing without the assistance of qualified enlisted personnel.

The medical branch of the Army is a highly technical one; for this reason it may not be amiss to point out that the time has gone by when any recruit, found unfit for service in the line, was still considered good enough to be transferred to the Medical Department. Nevertheless I do not wish to be understood that in selecting recruits we should eliminate any who do not come up to a fixed standard of mental development, for the medical branch of the military service is functioning as any other military organization, and, accordingly, embraces activities which have no immediate relation to the care of the sick and wounded.

I believe that the recruiting problem for our services, be that for the Regular Army, the National Guard, and whatever other volunteer force shall be decided on when a definite military policy for our country will be a reality, will be best solved by a pooling system; that is to say, enlistments in the medical branches of our military forces should be direct and permanent service in that branch should be allowed only after a period of probation.

For the National Guard, at least, the selection of enlisted personnel for the regimental sanitary detachments, ambulance companies and field hospital companies is a comparatively easy matter. My experience has shown that medical students, and those following certain cults or medical sects, are not good material. The acquisition of a limited number of pharmacists and chiropodists is desirable.

In the National Guard recruiting is accomplished by personal efforts on the part of officers and enlisted men.

Occasionally one finds an unusually high class of young men, carefully selected. That this is not an ideal arrangement is illustrated by a personal experience.

When the Mexican Border Service mobilization compelled me to increase the strength of my field hospital company, I selected a few

[1] Read at Annual Meeting, New Orleans, La., April 22-24, 1920.

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"rough necks." One of my noncommissioned officers came to me and pointed out that I was lowering the "social standard" of the organization. He was afraid the *esprit de corps* would suffer.

"Is this a mobile unit?" I asked my protester, by way of reply.

"Yes, sir."

"It is an animal-drawn outfit, is it not?"

"Yes, sir."

"Then whom of our boys would you select to drive the four-mule teams?"

There was no answer.

When we were stationed in the field off Fort Sam Houston we received some horses and mules that would have done credit to a Bolshevik cabinet, but not to a peaceful, ambitious, regulation-abiding field hospital. I thought I was fairly well posted in equitation and tried my luck—for a few seconds. Even a young officer who had lived on a ranch held himself in the saddle exactly four seconds. One enlisted man after another was given an opportunity to tame a broncho, with more or less equal results. Finally my triumph came. The latest recruit, who still spoke in the brogue of the western plainsman, got on, and, to the amazement of all, brought the balking animal back from the drill ground sweating, tired, tamed and respectful toward the drill regulations for sanitary troops.

On the other hand we suffered during our service in France from want of clerical help. I recollect that, when I was in command of a large base hospital in Bordeaux, I was keeping hot the wires begging Tours to send me a few men to help out in the record office. The clerks had been working day and night to evacuate thousands of sick and wounded and the grueling grind of the limited force caused me to become desperate. Tours directed a hospital about to be closed to send me a few clerks. When these arrived it was found that only one knew how to handle a typewriter and could spell sufficiently well not to require an ounce of ink per page for correction—as for the rest, they could squeeze the keys with one finger. Later the chief surgeon's officers confessed that they were combing the entire A. E. F. to secure a few clerks for their own headquarters.

We see, therefore, that in organizing hospital corps detachments we need a variety of trained men, and their training along military lines should be elastic enough to develop each class of recruits along their special qualifications.

To plan a general course of instruction so as to enable each and every member of the Medical Department to fill any and all vacancies is absurd. You cannot make a pharmacist out of a mule driver, and it

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certainly would be better to teach the pharmacist subjects pertaining to his work and not waste his time with equitation.

The assignment of soldiers of the Medical Department to sanitary units or detachments requires a good deal of thought. Should a soldier once assigned to a regimental detachment be permitted to remain with such a unit only, or is it practical to interchange them, that is to say, transfer them from regimental detachments to ambulance companies, field, evacuation and base hospitals, and vice versa?

There can be no doubt that the interchange of personnel is highly desirable. It broadens the soldier's capabilities and, besides, there may be imperative reasons for exchanges. One man may be useless in one unit because of circumstances beyond his control and prove a valuable member in another unit. Then there is the eternal question of replacement of losses, etc. But to interchange enlisted personnel without reference to their special qualifications would be a grave error. We find a hint about this in the Tables of Organization. This, in my opinion, should be extended to meet all conditions of military life. It is not sufficient to list the personnel by military grades and occupations, *e. g.*, sergeant, first class, corporal, cook, farrier, mechanic, chauffeur, etc., but to specify such military qualifications as litter bearer, ambulance man, nurse, sanitary, etc.

In other words, we should determine whether men are suitable for service on the firing line, with frontal sanitary formations, or with the larger institutions of the service of the rear, and, once that has been determined, the training for each particular class must be carried through with logical sequence.

Recruits should be sent to a training depot for medical personnel. Here instruction begins with the infantry drill without arms. The men are taught military bearing, a few simple evolutions, a few simple exercises with the litter, the loading and unloading of ambulances, etc. The work should not be tiring. Routine duties in and around barracks, under the supervision of a trusted and reliable noncommissioned officer, will form the greater part of the work.

After a probation of about a month the recruit will be no longer a mere cipher in uniform but an individual betraying certain qualities, and now it will be easy to determine for what particular service he is best adapted.

Let us assume that it is believed he will prove most useful with a regiment. His qualification card should show: "Regimental litter bearer." Such a man will be useful also with the litter section of an ambulance company.

After definite assignment his instruction will consist of first aid,

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with special reference to the arrest of hemorrhage, the application of extension splints, the treatment of shock, etc. Practical exercises will not be restricted to the application of tourniquets, splints, etc., in ordinary positions, but in the field under conditions of modern warfare.

Whenever his regiment or battalion is instructed in war methods, he and his comrades should accompany the line units in order to observe the methods of deploying as skirmishers, the taking of cover against enemy fire, the rushes, retreats, etc. He must be taught something about the trajectory of infantry and artillery arms.

Time was when a hospital corps detachment marched behind a regiment. When the battalions deployed for imaginary action, the medical detachments took litters, came to the carry, and at the word of command the squads took appropriate litter intervals to the right and left and followed the advancing rifles. A particularly militaristic medical officer or inspector would be delighted only when the litter-bearers marched forward in perfect alignment.

I am as fond of military display and, therefore, of "perfect alignment" on occasions of parade as anyone in or out of the service. I can even see something good in the much ridiculed and maligned parade step of the old German Army, but there is a time for everything, and in the field, especially when training for the serious business of war, such a display of military precision is as absurd and ridiculous as it is harmful.

Let me state the rôle of the regimental litter-bearers in these words:

The regimental litter-bearer on the firing line is an unarmed infantry soldier. Even his "medical rifle," the litter, is superfluous, especially on a flat terrain. His purpose is to render first aid and to collect the wounded. To accomplish this he must utilize the same tactics employed by the infantry. He must advance by rushes, reach the wounded, help them without exposing them or himself unnecessarily and maintain liaison with his comrades and the medical officer in charge.

The question of transporting the wounded to the rear comes up later when the tactical situation permits. This statement may be objected to as revolutionary and as contrary to the humane spirit of the medical service, and it may be held that the prime purpose of the enlisted personnel on the firing line is to litter the wounded back to the regimental aid stations, where the surgeons can administer scientific second aid. Painters have glorified the litter bearers carrying wounded to the rear while shrapnels are bursting in the air. My wife once remarked, when seeing such a picture, that the bearers must be brave, otherwise they would drop their wounded and run for safety.

"They couldn't," I replied.

"Why not?" she asked.

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"Because the bearers and the wounded were killed immediately after the photograph for the picture was taken."

And that is the plain truth.

Nor am I stating anything new. Paragraph 643 of the Manual for the Med. Dept., U. S. Army (1917), says: "The detachment invariably accompanies its line unit in combat, rendering first aid to as many as possible of those who fall out without losing touch with the command."

In paragraph 647 we read ". . . the remainder of the detachment keep in touch with the firing line, tending the wounded as far as possible and conveying the helpless to the station, if practicable. If the enemy's fire is such that the wounded cannot reach the station, advantage is taken of trenches, ravines and other inequalities of the ground affording temporary shelter, and the wounded are brought in during intervals in the firing or after nightfall."

These few lines, couched in official language, speak volumes! The helpless are conveyed to the station, if practicable. How often will it be practicable? In trench warfare, nearly always; in open or mobile warfare on a flat terrain, very seldom. We have the official directions. The "how" of carrying out these instructions is not a simple matter and requires a good deal of instruction of our enlisted men. But this instruction must be of a practical character. The soldiers, after a brief theoretic course, should be instructed in medical maneuvers in the field. Half a detachment serve as wounded and are placed with all sorts of imaginary wounds in prearranged positions on the field; the other half are instructed to reach them under fire, to administer first aid under fire, that is to say, while patient and helper are in the prone position, and to drag their patients to suitable places. I use the word "drag" advisedly, for, in my opinion, the litter is not an ideal appliance in open warfare. I show you a simple piece of canvas with straps. Once a patient is placed on such a "sand-sleigh" he can be dragged away by one man over comparatively long distances. And while on this subject, permit me to point out that for service on the firing line the medical belt is not practical. In the first place, it does not hold enough dressings, and at the front the first aid equipment should consist of 99 per cent individual packets; in the second place, with the thick belt around one's waist, crawling is rendered very difficult. A strong, old-fashioned canvas pouch or hunting bag is, in my opinion, the ideal container for the first-aid materials for service on the firing line, since it can be slung over the back or side by one movement and does not interfere with locomotion, to say nothing of its affording protection against shrapnel balls.

In such exercises opportunity should be afforded each soldier to apply his theoretic instruction in: (1) Map reading, (2) leadership, (3) liaison.

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Map reading in the medical department has been treated like a step-child. We do not demand expertness, but the ability to interpret a map, to find any point in a terrain, to know map and terrain direction by compass, is an elementary but vital thing.

As regards leadership, the noncommissioned officers of each detachment must not wear their chevrons simply for the purpose of drawing additional pay. These men should be instructed in estimation of situations.

I recollect that some years ago I was asked by a regimental surgeon to accept for my outfit an unusually well-trained sergeant with a view of recommending him for promotion, as I then had a vacancy.

I asked this soldier a simple question: "A battalion of four companies is on the firing line and has been for an hour. The attack by the enemy is not evenly distributed. Tell me in what company you would expect the heaviest casualties." He thought a good deal. Finally came this piece of ultra-strategic wisdom: "The company which faces the larger force."

I had to admit that the sergeant was right. But I asked him how he would determine that when the enemy is invisible to him. He did not know—that was the business of the medical officer in charge. Such a man is not a good noncommissioned officer, for he must have the ability to direct the movements of the men under him with tactical intelligence. The question of liaison is not difficult, provided the intervals between the men are not too great. In such cases instruction in signaling with whistles having a sound differing from that used by the infantry, or with lanterns giving off colored light in the direction away from the enemy, is of great importance.

The enlisted men of ambulance companies should be given similar training, to be able to assist the regimental detachments. Of course, a certain number will be so trained as to prove valuable at the dressing station, but the majority of each company must be able to do litter and ambulance work with technical perfection. As for those intended for hospital units—and by that I mean formations affording prolonged hospitalization—three groups should be organized, namely: (1) Ward orderlies, (2) administration soldiers, (3) mechanics.

For these there is a brief common course, consisting of military drill, map reading, tent pitching, sanitation and general discipline.

The administrative soldiers should be trained in army regulations, in clerical work with special reference to reports, requisitions, etc. Ward orderlies should be trained as male nurses.

The mechanics will be instructed in the handling of automobiles and trucks, in practical electricity, carpentry, etc. The specialistic train-

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ing of assistants to radiographers, oral surgeons, anesthetists and the like needs no comment. The question presents itself whether it is wise to teach enlisted men subjects which properly come within the province of the female nurses. I have no fault to find with the nurse corps, but

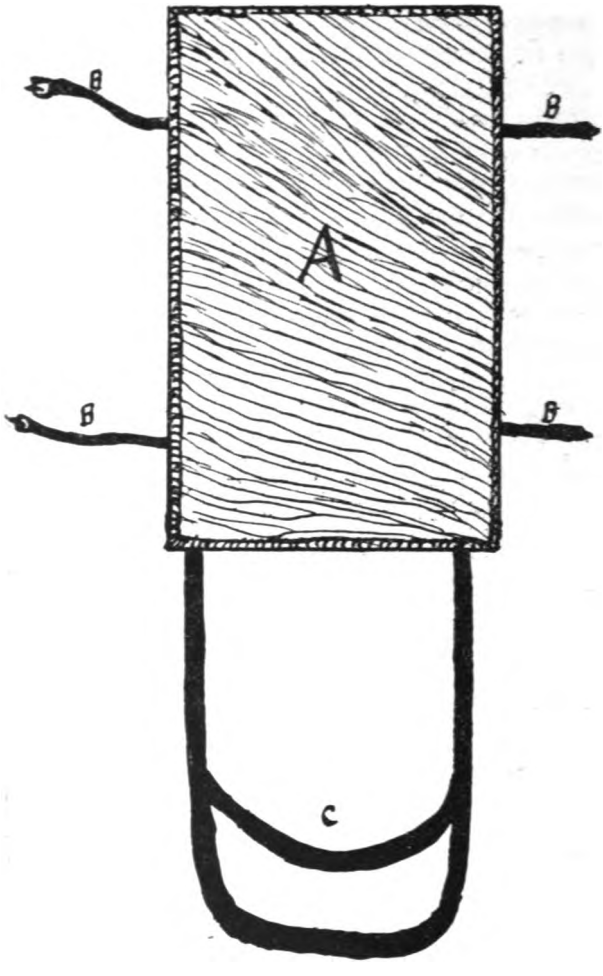

FIG. 1.—AUTHOR'S CANVAS "LITTER."

"A" Body partly enveloping patient. "B" Straps to fasten over body of patient. "C" harness enabling soldier-bearer to drag patient while crawling.

I am frank enough to say that women should not be allowed in the zones of activities. My experience in France has been that in the original Red Cross base hospitals the cultured and intelligent young men who had enlisted with the hospitals and who were assigned to ward

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service found themselves out of a job. The nurses would not allow them to do anything but menial work, and the men longed for active service.

These men could have learned in a few months to do as good work as female nurses had they been given an opportunity, and discipline would have been maintained with ease, because nurses very often considered themselves capable of criticising ward surgeons, not realizing the difference between conditions of civil and military service.

We have a dearth of male nurses in the United States. It is considered a profession fit for women. The fact is, as you and I know, that there is ample room for good male nurses, and if the Army will afford adequate instruction and issue appropriate diplomas, these men would find useful fields in civilian general hospitals, hospitals for the insane, and in genito-urinary institutions.

With men adequately trained along the lines outlined above, we shall be prepared to render the best possible service, provided our medical officers can furnish the oil to make the entire machine run smoothly.

NOTE.—The author is indebted to the Gold Medal Camp Furniture Mfg. Co. of Racine Wis., for the manufacture of the "sleigh-litter" shown in Fig. 1.

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EDITORIAL

SIR WILLIAM OSLER AND THE FIXED PERIOD

So much has been written in regard to Sir William Osler since his passing that it seems not inappropriate to dwell for a little while on what was a world wide misconception of his views—to correct an impression which was at entire variance with that which he believed.

Our brothers of the lay press are quick to seize anything which shall hold the public eye—shall serve as a catch caption to point a truth, or what they assume, often in hasty judgment, to be a truth.

And so when Sir William delivered his valedictory to his friends and associates at Johns Hopkins University on February 22, 1905, the newspapers of the United States read into his address a meaning which was not there and credited him as serious in the advocacy of a policy of removing men after they had attained a certain sum of years. To "Osleize" was made a verb, and there was a very general reaction against what was assumed to be Sir William's advocacy of a very uncompromising euthanasia. No one seemed to stop to reflect on the absurdity of a man of Osler's mentality considering seriously a doctrine, if we may call it such, which transgressed every law of mankind and humanity. The prominence of the speaker, and the very fact that in his address there seemed to be a flimsy nail on which to hang this acceptance of a theory, made good opportunity for readable "copy," and both news sheet and editorial page made abundant use of it.

Those who were privileged to know Sir William Osler will remember him as a man of a delightfully whimsical humor and also of a very real and refined tenderness, and as such, the utterance, seriously, of the doctrine ascribed to him must always remain as an absurdity. The whole business had as its foundation Osler's reference to the little known novel of Anthony Trollope, "The Fixed Period." As this book is practically unobtainable at the present time we quote from it to show the general trend of the work and the vein of satire in which it was written. The following excerpt is quite characteristic of the style of the composition:

"What should be the Fixed Period?" That was the first question which demanded an immediate answer. Years were named absurd in their intended leniency—eighty and even eighty-five! "Let us say a hundred," said I, aloud, turning upon them all the battery of my miracle. I suggested sixty; but the term was received with silence. I pointed out that the few old men now on the island might be exempted, and that even those above fifty-five might be allowed to drag out their existences if they were weak enough to select for themselves so degrading a position. This latter proposition was accepted at once, and the exempt showed no repugnance even when it was proved to them that they would be left alone in the community and entitled to no

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honour, and never allowed even to enter the pleasant gardens of the college. I think now that sixty was too early an age, and that sixty-five, to which I gracefully yielded, is the proper Fixed Period for the human race. Let any man look among his friends and see whether men of sixty-five are not in the way of those who are still aspiring to rise in the world. A judge shall be deaf on the bench when younger men below him can hear with accuracy. His voice shall have descended to a poor treble, or his eyesight shall be dim and failing. At any rate, his limbs will have lost all that robust agility which is needed for the adequate performance of the work of the world. It is self-evident that at sixty-five a man has done all that he is fit to do. He should be troubled no longer with labour, and therefore should be troubled no longer with life. "It is all vanity and vexation of spirit," such a one would say, if still brave, and still desirous of honour. "Lead me into the college, and there let me prepare myself for that brighter life which will require no mortal strength." My words did avail with many, and then they demanded that seventy should be the Fixed Period.

How long we fought over this point need not now be told. But we decided at last to divide the interval. Sixty-seven and a half was named by a majority of the Assembly as the Fixed Period. Surely the colony was determined to grow in truth old before it could go into the college. But then there came a further dispute. On which side of the Fixed Period should the year of grace be taken? Our debates even on this subject were long and animated. It was said that the seclusion within the college would be tantamount to penal departure, and that the old men should thus have the last lingering drops of breath allowed them, without, in the world at large. It was at last decided that men and women should be brought into the college at sixty-seven, and that before their sixty-eighth birthday they should have departed."[1]

Using this as an illustration in his address already referred to and adopting the caption as the heading of his valedictory, he went on to enunciate his belief that the most effective work of thinking men is done before the age of forty and that after sixty there is little constructive work accomplished, although there may be much that is advisory. He used the text of Trollope's novel in a vein of gentle satiric humor to ease the pain of parting from those with whom he had so long been intimately associated in the development of so perfect an educational machine as that at Johns Hopkins. To mask, perhaps, his own feelings in severing the relations which had bound him closely to those who had striven with him in the perfection of the task which they had set themselves, he quoted whimsically from this work of Trollope. And the public at large, failing to understand the feeling which underlay the reference and the rather pathetic allusion to his own advancing years, could see nothing in his words save the heartless view of a very cold scientist who condemned man save as an actively producing machine. Thus to this very human savant was attached the stigma of the advocacy of the putting away of men when they had reached a certain age.

"The Fixed Period," which we have quoted, is a whimsical production in which the author takes up the question of euthanasia and in

[1] "The Fixed Period"; Anthony Trollope. Tauchnitz Edition, Leipzig, 1882, No. 2055, pp 20-21.

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a vein of rather grisly, sardonic humor shows the manifest absurdity of the whole pernicious doctrine. He creates a colony which is independent of Great Britain, the mother country, and pictures as president a fanatic who has as his controlling mania the idea of the final disposition of men who have arrived at a certain age determined by his advice and the enactment of law by the governing body. He (Trollope) traces the state of mind of a friend of the president who, under the statutory working, is to be the first to be suborned to the law. The situation is complicated by a love affair between the daughter of this friend and the son of the president, and not only the absurdity of the whole scheme, but the utter impossibility of arriving at any consensus of opinion as to when a man should be put away, is shown by dialogue and discussion among the various residents of the State. The work ends with the resumption of the possession of the colony by Great Britain, the readjustment of the legal code, and the deportation of the one-ideaed president to England, where it is assumed that he can work no further harm.

The whole thing is so fantastic that anyone knowing the book and also knowing that Osler had referred to it could not possibly have entertained any belief that he took it seriously. And so, for the error of having indulged his sense of humor in a medium which was not current with the generality of people, he was condemned to bear the censure of much of the reading public for having advanced a doctrine which was, as a matter of course, abhorrent to men, young or old.

In the preface to his volume of collected addresses, "Æquinimitas and Other Addresses," he says:

> To this edition I have added the three valedictory addresses delivered before leaving America. One of these—The Fixed Period—demands a word of explanation. "To interpose a little case," to relieve a situation of singular sadness in parting from my dear colleagues of the Johns Hopkins University, I jokingly suggested for the relief of a senile professoriate an extension of Anthony Trollope's plan mentioned in his novel, "The Fixed Period." To one who all his life had been devoted to old men, it was not a little distressing to be placarded in a world-wide way as their sworn enemy, and to every man over sixty whose spirit I may have thus unwittingly bruised. I tender my heartfelt regrets. Let me add, however, that the discussion which followed my remarks has not changed, but has rather strengthened my belief that the real work of life is done before the fortieth year and that after the sixtieth year it would be best for the world and best for themselves if men rested from their labors.

It would seem evident in this that the heart of the man had been hurt and that he was wistful that he should not be adjudged as one who measured all men solely by the light of pure reason and excluded from the weight of his estimation all human elements of love and appreciation.

To those who were fortunate in knowing Sir William Osler personally there is little need for explanation of this sort. Any contact with him

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was more than enough to make certain that, combined with the sure mind of science, with the keen perception of the highly gifted and trained intellect, there was so much of the intensely human that no such idea could even germinate in his being.

Unfortunately there are those who are forced to form their opinion on hearsay evidence—on what they read or have been told, and it is those who should know the real facts of the case.

It is quite true that Sir William believed that after sixty years a man was seldom a productive factor, as the following excerpt from his address of 1905 at Johns Hopkins shows:

> I am going to be very bold and touch upon another question of some delicacy, but of infinite importance in university life—one that has not been settled in this country. I refer to a fixed period for the teacher, either of time of service or of age. Except in some proprietary schools, I do not know of any institutions in which there is a time limit of, say, twenty years' service, as in some of the London hospitals, or in which a man is engaged for a term of years. Usually the appointment is *ad vitam aut culpam*, as the old phrase reads. It is a very serious matter in our young universities to have all the professors growing old at the same time. In some places, only an epidemic, a time limit, or an old age pension can save the situation. I have two fixed ideas well known to my friends, harmless obsessions with which I sometimes bore them, but which have a direct bearing on this important problem. The first is the comparative uselessness of men above forty years of age. This may seem shocking, and yet read aright the world history bears out the statement. Take the sum of human achievement in action, in science, in art, in literature—subtract the work of the men above forty, and while we should miss great treasures, even priceless treasures, we would practically be where we are today. It is difficult to name a great and far-reaching conquest of the mind which has not been given to the world by a man on whose back the sun was still shining. The effective, moving, vitalizing work of the world is done between the ages of twenty-five and forty—these fifteen golden years of plenty, the anabolic or constructive period, in which there is always a balance in the bank and the credit is still good. The young men should be encouraged and afforded every possible chance to show what is in them. . . . And herein lies the chief value of the teacher who has passed his climacteric and is no longer a productive factor, he can play the man midwife as Socrates did to Theaetetus and determine whether the thoughts which the young men are bringing to the light are false idols or true and noble births.
>
> My second fixed idea is the uselessness of men above sixty years of age, and the incalculable benefit it would be in commercial, political, and in professional life, if as a matter of course, men stopped work at this age. . . . The teacher's life should have three periods, study until twenty-five, investigation until forty, profession until sixty, at which age I would have him retired on a double allowance. Whether Anthony Trollope's suggestion of a college and chloroform should be carried out or not I have become a little dubious, *as my own time is getting so short.*"[2]

Although it is true, as we have said, and is evidenced in what is quoted above, that Sir William believed that after sixty years of age a

[2] Italics ours

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man was not a productive factor, it is emphatically untrue and altogether unthinkable that he ever believed in, thought of, or suggested that practice which came so unfortunately into prominence as "Oslerism."

JAMES ROBB CHURCH.

SOME RECOLLECTIONS OF SIR WILLIAM OSLER DURING THE WAR

It was my good fortune to be detailed in May of 1918 as Chief Surgeon of Base Section No. 3, of the American Expeditionary Forces. The duties of this position involved, among other things, the establishment and maintenance of hospitals for American troops in England, and we provided hospitalization amounting to about 9,000 beds, prior to October, 1918, at which time my connection with the activities was suspended. During this period I saw Sir William Osler frequently, and it was always my outstanding impression that I must marvel at the energy, activity, and interest which he showed at his time of life, and under the stress of his enormous work in England, in everything which in any way related to the medical care of American soldiers. These faculties seemed to have a particular application to military medicine, which of course was at that time, both in England and France, the outstanding line of the endeavor of all medical men. It is needless to say that his consultation work with the British Army and public was very great, but it was very evident that he placed so thoroughly at the front any call which came to him, whereby he might be put into touch with the activities of the American Medical Department.

As I apprehend his bent at the time, there was no circumstance connected with the medical welfare of our troops which did not get from him a precedence in his daily work, and which resulted in his being always present at any function which connoted the effort to better the state of our men hospitalized in England. I never gave him an invitation to go to one of our hospitals, which were widely scattered, that he did not eagerly take it, to the great delight of everybody who was fortunate enough to be the beneficiary of the visit. He frequently came with his very charming lady. I recall very well a day we spent going by motor to Dartford, about 20 miles from London, where the King's County (Brooklyn) Base Hospital Unit No. 37 (Lieut. Col. Edward Fiske) maintained a large hospital of 2,500 beds. The day was delightful from the point of the natural setting, and the sunshine in the hospital was made the more acceptable by the delightful presence of the great medical man, as he walked through the wards, cheering the patients by the charm of his cordial and jovial wit, which he dropped so spon-

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taneously. Soldiers' comments on his visit, had he known them, would have justified so vastly his effort in having come.

It was characteristic of him that immediately upon going into one of these hospitals, he would take the commanding officer by the buttonhole, and with an assumed censorious air, say to him: "Show me your laboratory! If you haven't a good laboratory, you have a bad hospital, but I am sure you are too energetic an American doctor not to have a good laboratory." Then he would begin the propounding of questions as to the pathological study carried on in the hospital, and if there were deficiencies in the laboratory section it is needless to say that this attitude of mind on his part got an immediate reflection into the mind of the man who was running the institution, and the laboratory followed in the march of things.

As I have said, the untiring and ever-ready quality in Sir William was to me remarkable, but not more so than the astounding range of his knowledge of medicine, and of surgery, too, as revealed in conversations with him. I am sure I talked to him on no subject in any way relating to the medical sciences that I did not at once get an inspiring response.

I recall very well another delightful visit which he made to Winchester to contribute a bit to a Medical Officers Clinical Society, which Major W. Jason Mixter of Boston had established among the officers at the large camp at that place. In the face of the worst kind of weather and surroundings by no means conducive to the comfort that three score and ten usually seeks for itself, he went to this meeting at Winchester and led a delightful symposium on medicine as found in camps. Weather or any other adverse influences did not in the most remote degree lessen his enthusiasm.

When we opened up our large hospital at Portsmouth, which was in charge of the Albany Base Hospital Unit No. 33, commanded by Capt. (afterwards Lieut.-Colonel) Erastus Corning, Sir William went to the inaugural exercises, raised the American flag over the institution, and made an address which was calculated to instill and foster a perfectly indomitable pride in every man who belonged to the unit.

I mention these several things as illustrations of the practical output, which represented the workings of his spirit when it met opportunities to exalt and benefit his beloved profession. It must be remembered that all during this period he carried with him the awful blight and sorrow, which comes to the man of his age, who had lost irretrievably the hope of his life, represented by the splendid son, who had been killed on the field of battle in France. I remember one day when we were driving together, he turned and said to me: "Man's greatest pleasures in this world are

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of such uncertain tenure, and the moment wipes out the joy of the past and the hope of the future." I said, "I understand, Sir William, what you mean." He nodded and looked out of the window of the motor in which we were driving.

It is touching to recall a pathetic reference he made to me one day affecting his age. "Ah," he said, "if I were but a young man, so that I might take up, under modern conditions of knowledge and study, such a subject as neurological surgery. Think of the grandeur of such work when a fellow works up his case, does his surgery and is master of the entire field! How I wish I could start in, under the present state of specialized knowledge, and do work like that."

More I think, than any man I ever knew, Sir William seemed to me to realize the idea of a delightful living book. The alternations of deep wisdom with airy persiflage and subtle humor brought to my mind several times the notion that I was enjoying a living Addison or Doctor Holmes. The transitions and shadings of the "Spectator" and the "Autocrat" are no more diverting and charming than those same contrasts which one met in Sir William, and to the profound comment on blood pathology there would succeed so easily the delightful and mirthful story of himself or others. The scintillation was like sunshine on the wave crests of an ocean of thought. I doubt if any man ever shone with more charm than he at a dinner table, and the recollection of several occasions at the Athæneum (evidently his special club) and at other places in London is a heritage to those of us who were privileged to be present.

His home at Oxford was much of a Mecca to medical officers in England, and all the graces were to be found there.

It was sometimes surprising to me to see his manifestations of interest for individual medical officers, notably those who had been his old students. I had a number of letters from him, from time to time, telling me that Brown was a good chap in a laboratory, or that Robinson was a first class clinician. These certifications were most helpful to me.

Surely this gentle, forceful, inspiring man was ever on the quest of anything that might benefit and exalt medicine, and I hope he was as happy in the doing of the kindly and helpful act as he made those who were the beneficiaries of his soulful touch.

FRANCIS A. WINTER,
Colonel, Medical Corps, U. S. A.

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ASSOCIATION NOTES

At a meeting of the Executive Council of The Association of Military Surgeons, April 21, 1920, the following names were proposed and elected to membership in the Association:

Medical Corps, U. S. Army

Colonels

James L. Bevans
George F. Keenan

Lieutenant Colonels

John W. Amesse
H. H. Rutherford

Majors

Frank E. Bellinger
Leonard A. Ensminger
David S. Fettes
Harold A. Fiske
Benjamin F. Hawk
Walter D. McKenna
Wilbur W. Ross
George W. Strough
Budd Van Sweringen
Charles Van Wood

Captains

Frank C. Abbott
Buford C. Bird
Morris H. Boerner
Leslie S. Brookhart
Paul G. Capps
Robert J. Campbell
William L. Crawford
Gordon T. Crozier
Henry C. Dooling
Dan M. Forbes
John C. Foshee
William F. Gabbert
Edward T. Gruetzner
Roy C. Gutch
John G. Harrington
Columbus Hyder
Frank C. Katherman
William C. Keller
John Logue
Arthur S. Love
Julian D. Lucas
Edward C. Lyon
Edward B. Macon
Alfred L. Malabre
Perry J. Manheims
Maxwell C. Montgomery
Frederick L. Morse
Nathaniel Palmquist
Marvin W. Reed
Walter R. Russell
Joseph Saylin
Marcel W. Sherwood
Brand Starnes
Albert B. Stuart
John L. Tierney
Henry G. Watters
Emory I. Whitehead

First Lieutenants

John F. Ahern
Hugh M. Barnes
Daniel J. Boland
John A. Bowles
Chester R. Brigham
T. M. Brister
Lester R. Brown
Amos Canfield
Allen Coburn
William T. Collins
Llewellyn J. Coppedge
George W. Cox
John L. Cruzen
William H. De Clark
Edward F. Dombrowski
Richard D. Dugan
Lawrence G. Dunlap
Richard S. Farr
R. Ernest Gilbert
William B. Goddard
James R. Gorman
C. H. Hoffhine
Benjamin H. Huggins
Leon C. Ives
A. E. Jones
Robert H. Lerce
Eli Levin
Benjamin J. Lewis
John H. Mallery
Donald E. McKenna
James A. McKenney
James P. McManus
Rudolph R. Miller
Elmer E. Mystrom
Willard Phipard
George P. Rawls
Robert K. Stewart
Samuel B. Thomas
John D. Thomas
Ronald M. Troup
William F. Weingart
John M. Wilson

Medical Reserve Corps, U. S. A.

Colonels

Walter A. Sherwood

Lieut. Colonels

Carl L. Barnes
Frank H. Paterson
James M. Washburn

Majors

Isaac N. Adams
Archibald A. Atkinson
William F. Bonner
John W. Christensen
John A. Conway
Van Cookerly
George H. Cruikshank
James C. Davis
Robert H. Gibson
William L. Hearst
Erik St. J. Johnson
Herman S. Judd

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Majors

Edwin J. Lent
James A. McDevitt
Donald L. Miller
Walter J. Nichols
Arthur A. Pace
Charles B. Reed
J. Wm. Scales
John B. Setzler
Frank W. Shelton
Clint C. Sourwine
Ira C. Tyndall

Captains

Benjamin F. Adams
George Alexander
Frank P. Atkinson
Harold F. Atwood
Edward V. del Beccaro
Henry M. Boies
Edward J. Burns
William H. Bennett
James C. Carr
Eugene J. Chesrow
Donald A. Curtis
Carrell W. Downey
Edgar W. Guilford
Allen T. Moulton
Jesse M. Pemberton
John Prather
George P. Sandrock
William L. Waites
Dr. James A. Young
M.R.C., U.S.A.

U. S. P. H. S.

A. A. Surg. Fred H. Works

Medical Corps, U. S. Navy

Lieutenant Commander

William H. Short

Lieutenants

Charles A. Ainslie
Murl E. Fulk
Lea B. Sartin

Medical Corps, U. S. N. R. F.

Lieutenants

Thomas E. Conley
John G. McPhail
Joseph F. Montague
Eiba B. Todd

Associate Members

Capt. Frederick W. Herms, D. C., U. S. A.
Capt. William C. Williams, S. C., U. S. A.

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COMMENT AND CRITICISM

REQUEST FOR INFORMATION

DUCTLESS GLAND DISEASES IN U. S. SOLDIERS DURING THE EUROPEAN WAR

Being interested in material on diseases of the glands of internal secretion in U. S. soldiers in our army camps and at the front during the European War, I should feel much indebted to any physician who has served as a medical officer in the Army during the war, who might be able to supply me with any information in regard to this matter, particularly statistical relations, semeiology, the incidence of these diseases in drafted men and in enlisted men who were subsequently on duty, and the measures taken in dealing with such cases. Any help that I may receive in this matter will be highly appreciated and acknowledged.

JAMES ROBB CHURCH,
Colonel, M. C., U. S. Army,
Secretary-Treasurer.

THE MODERN HOSPITAL CHANGES LOCATION

The Modern Hospital, having long since outgrown its former quarters because of the increasing service it is being called upon to render in the hospital field, has removed its offices to its own building at 22-24 East Ontario Street, Chicago, which will hereafter be known as The Modern Hospital Building.

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BOOK REVIEWS

History and Bibliography of Anatomic Illustration in Its Relation to Anatomic Science and the Graphic Arts, by Ludwig Choulant. About 450 pages. Royal 8vo. cloth. With one hundred illustrations. Advance Subscription Price, $[illegible]. A memorial edition.

Dr. Mortimer Frank, B.S., M.D., began the translation and revision of Choulant's *History of Anatomic Illustration* in 1916. His life-long study of medical history and his interest as a connoisseur in medical engravings, fine bindings, and rare books especially qualified him for this undertaking.

Dr. Frank finished his task and turned the manuscript over to the publishers just before his untimely death on April 21, 1919. A committee of his friends has chosen this volume as a fitting memorial to Dr. Frank because of its intrinsic value as a contribution to medical science and because of its intimate relation to his personal interest and enthusiasm.

Modern Surgery. By J. Chalmers DaCosta, M.D., Samuel D. Gross, Professor of Surgery, Jefferson Medical College Hospital, Consulting Surgeon to Philadelphia General Hospital, St. Joseph's Hospital, and Misericordia Hospital, Philadelphia; Consulting Surgeon to the Hospital for the Insane, Eastern District of Pennsylvania at Norristown. Fellow of the American Surgical Association; Member of the Society of Clinical Surgery; Member of the American Philosophical Society; Membre de la société internationale de chirurgie; Commander, Medical Corps, U.S.N.R.F., etc., etc. Eighth edition, revised, enlarged, and reset with 1,177 illustrations, some of them in colors. Philadelphia and London: W. B. Saunders Company, 1919. Price, $8.00.

Notwithstanding the statement of Doctor DaCosta in the Preface to this edition of his deservedly popular "Modern Surgery," that, because of the horrors of the war, "it was a great effort to sit at a desk and revise a book; it was an utterly impossible thing to do it as it should be done," he has made a success of his undertaking.

There is no single volume on general surgery in which so much information can be found. Not only are surgical injuries and diseases well described, but judicious, safe advice is given. That which is old but tried and good, still representing conservative methods and practice, is retained; that which may be called "up to date" or experimental, the knowledge gained in the World War, is added. A criticism which perhaps might be made is that too many pages are given up to describing and illustrating methods and procedures now obsolete, for example, in that part of the book treating of gastric and duodenal surgery, it would appear that bone bobbins, decalcified bone plates, certain anastomosis forceps, etc., long discarded, might have been omitted in a "Modern Surgery." Yet, when one considers more carefully, it is important that the simpler and much safer technique of today has developed because of the principles upon which the former uses of these aids were founded. It would seem then, as it is to be observed throughout Doctor DaCosta's unexcelled "Modern Surgery," that necessarily enough of the history of surgery is brought out to show us the present advance obtainable.

For years "DaCosta's Surgery" has been the ready reference book of the reviewer and he sincerely trusts the eighth edition may add to this confidence.

Jno. E. Summers

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THE SURGICAL CLINICS OF CHICAGO, Vol. 3, No. 6, December, 1919, and Vol. 4, No. 1, January, 1920. Philadelphia and London: W. B. Saunders Company. Price, cloth, $16.00.

These volumes continue to maintain the same high excellence of those that have preceded them. Particularly to be commended in the February number are the Clinics by Dr. Bevan, in which he ably discusses the subjects of Branchial Cysts, Intestinal Obstruction, Imperforate Anus, and a case of gauze sponge left in the gall-bladder—removal after an interval of eleven years. The cases presented and operated upon each had its practical lesson.

Dr. Wyllys Andrews' Clinic is interesting in that he operated upon a patient in whom the positive diagnosis of Cholelithiasis was made by radiograms. Although Dr. Andrews does not discuss the subject of the frequency with which gall-stones may be expected to be diagnosed by means of the X-ray, he does make the statement that "this (referring to his case) is one of the cases, probably a minority, which give positive findings in the radiogram." This statement is somewhat misleading as confirmation of X-ray diagnoses of gall-stones has, up to date, at operation, scarcely exceeded 10 per cent.

It is to be expected that improvement in X-ray technique will further increase the percentage, but the truth in an instance can only be solved by an operation.

Dr. Alfred N. Strauss has in this number the most noteworthy clinic that has appeared in these publications for some time. The subject of his clinic is Congenital Pyloric Stenosis. Dr. Strauss has had the rare experience of operating upon 103 of these unfortunate infants; only three have died. The supreme importance of fluoroscopy in the diagnosis is pointed out, and also the indications for surgical management. A number of good illustrations make plain the text in describing what impresses one as an original and excellent technique, justly credited as having life-saving advantages over the Rammstedt operation, which has a mortality in the most experienced hands of 15 to 20 per cent.

JNO. E. SUMMERS.

BOOKS RECEIVED

Books received are acknowledged in this department, and such acknowledgment must be regarded as a sufficient return for the courtesy of the sender. Selections will be made for review in the interest of our readers and as space permits.

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COLLECTED STUDIES ON THE PATHOLOGY OF WAR GAS POISONING. by Major Milton C. Winternitz, M.D., M.C., U.S.A., Professor of Pathology, School of Medicine, Yale University. New Haven, Conn., and 280 Madison Avenue, New York City. Yale University Press, 1920. Price, $20.00.

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Obituary

Those of our membership whose deaths have been noted since our last report are as follows:

Med. Dir. J. M. Flint, M. C., U. S. Navy.
Lieut. Silas B. Hull, M. C., U. S. Navy.
Col. L. A. LaGarde, M. C., U. S. Army.
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